THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CXI. No. 2467.] LONDON, AUGUST 23, 1910. [62ND YEAR. PRICE 6d.

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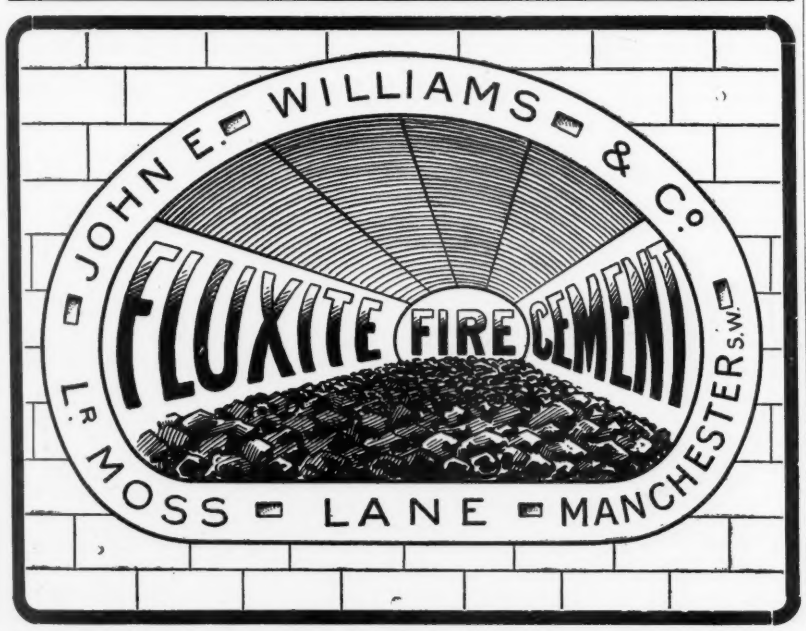

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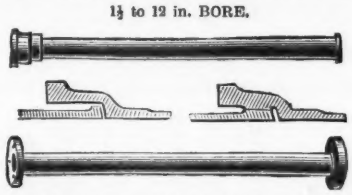

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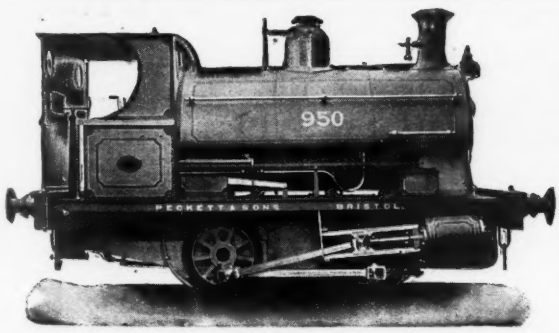

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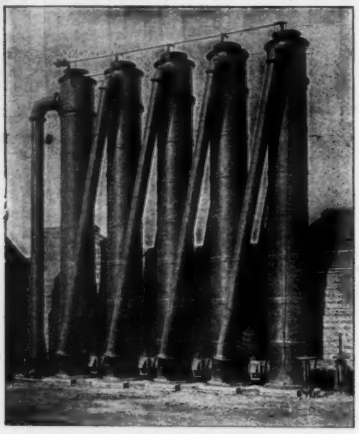

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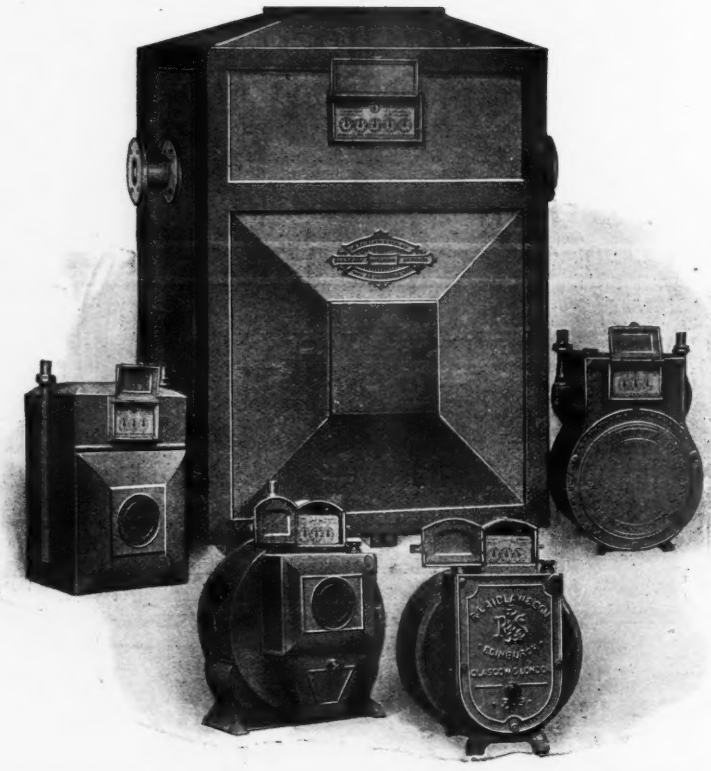

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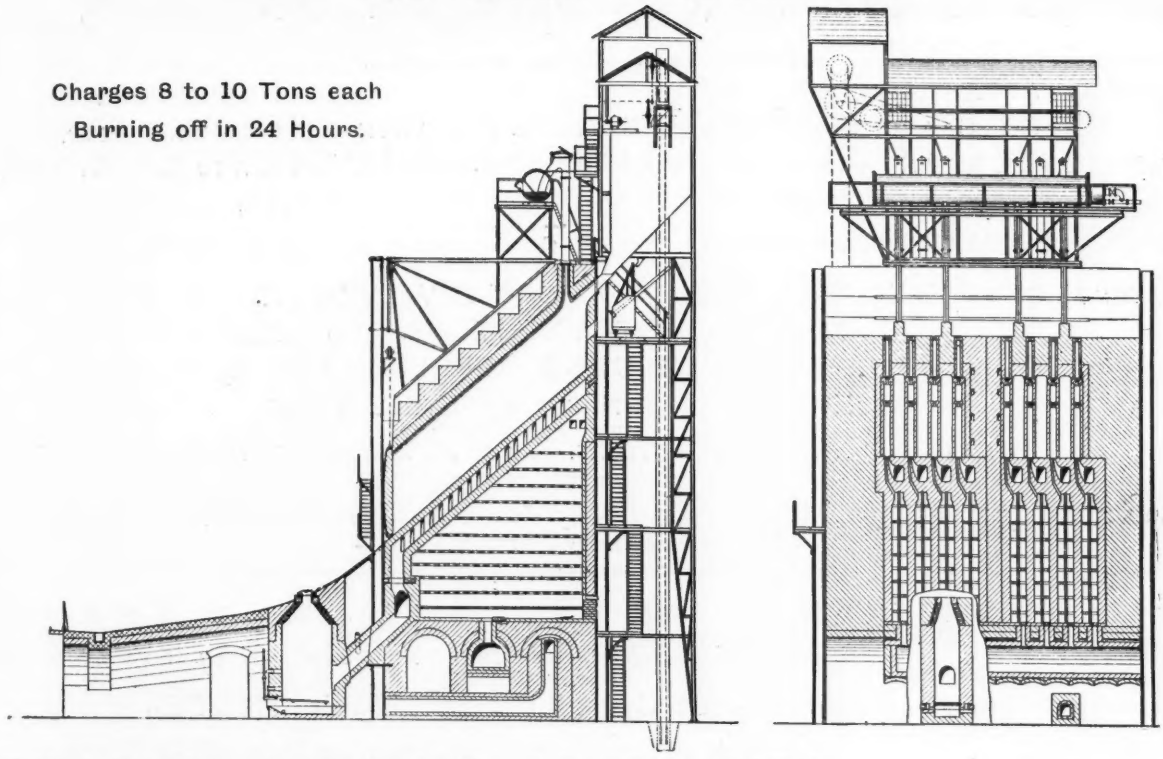

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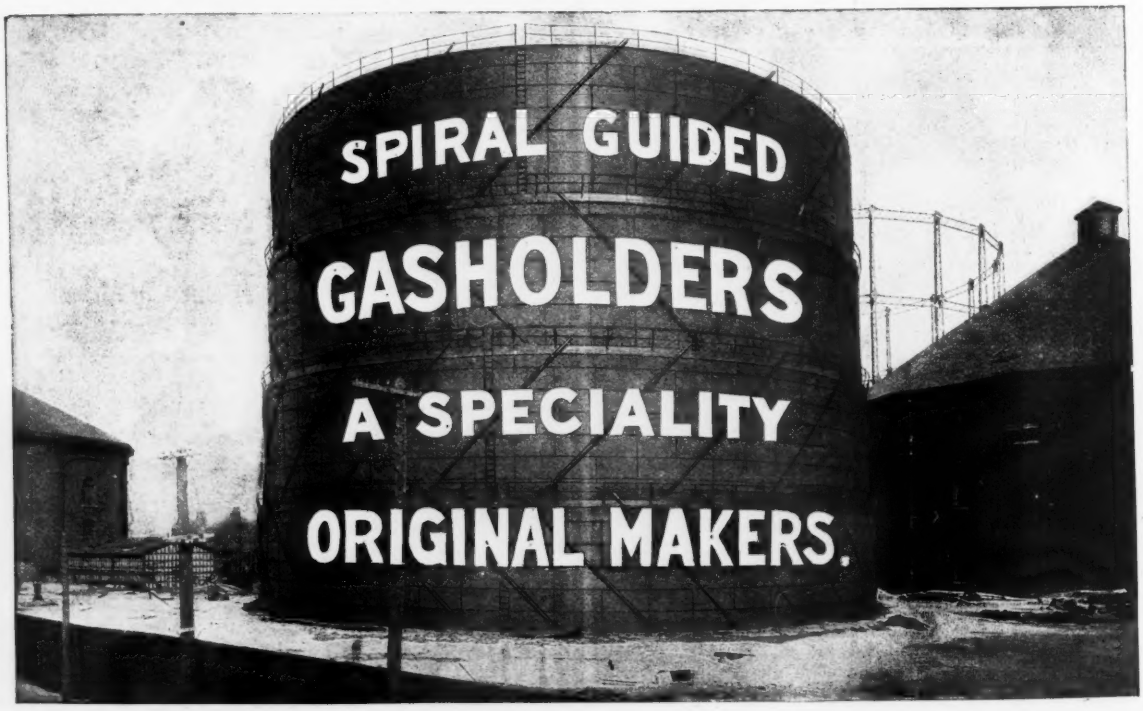

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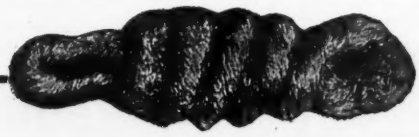

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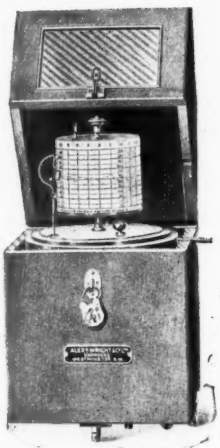

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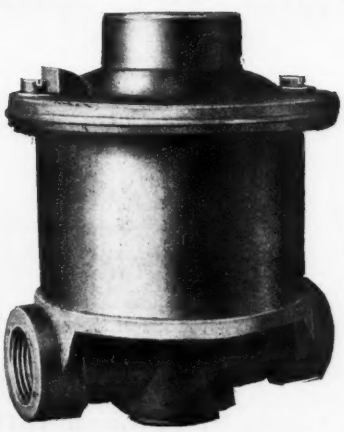

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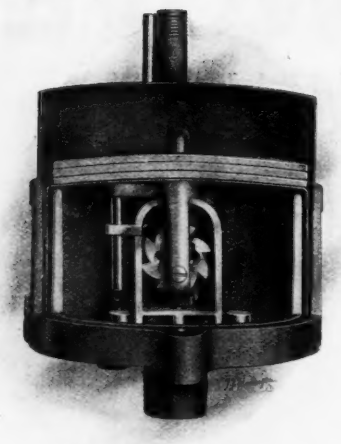

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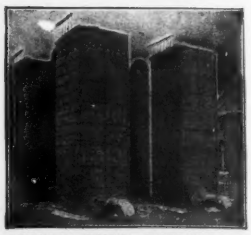

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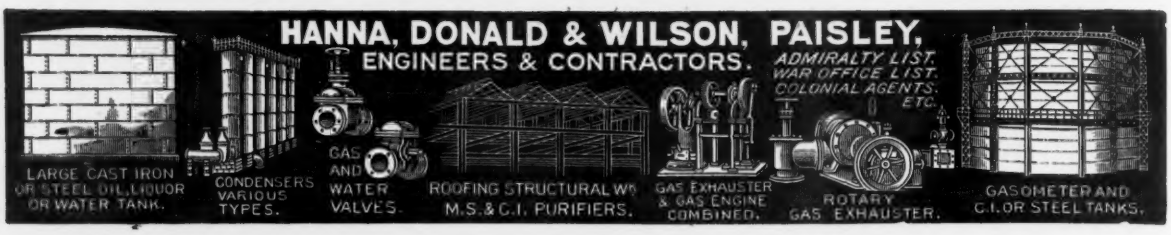
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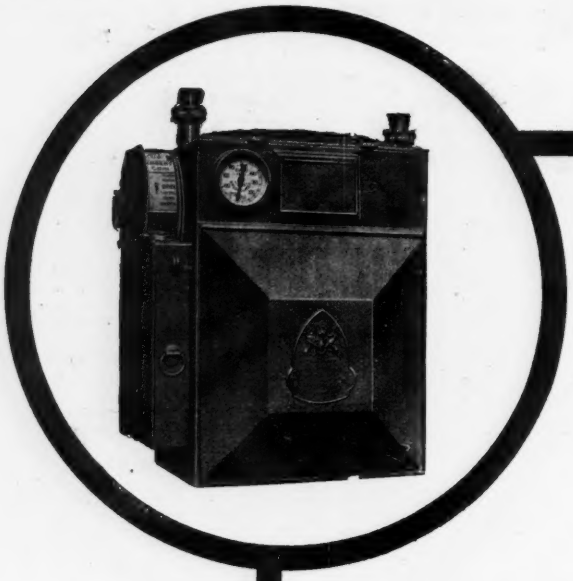

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VOL. CXI., No. 2467.—TUESDAY, AUGUST 23, 1910.

EDITORIAL NOTES—GAS, &c.

Separate Interests.

In our "Correspondence" columns there is a letter from Mr. R. H. Smith, the General Secretary of the Ironmongers' Federated Association, in which he suggests that the gas industry should join forces with the Electrical Contractors' Association and the Ironmongers' Federated Association in organizing opposition to the projected Bill for conferring upon the promoting municipal bodies powers for entering into trading in electric wiring and fittings. Some municipal bodies have been trading in this way without parliamentary authority; and through the recent Leicester case, they have been told that they are acting *ultra vires*. Thus they want to put themselves in proper legal order. Others who have not traded in wiring and fittings are anxious to procure the powers, though there is ample experience showing that the speculation in this direction has not been remunerative, but on the contrary has resulted in dead-loss. In Mr. Smith's letter, there is also a modest rebuke to the gas industry for not having supported the two organizations named, when they resisted—and successfully, too—the insertion of these powers in the Electric Lighting Acts (Amendment) Bill last year. When the gas industry originally appeared before the Committee, by Counsel, in opposition to the Bill, through the Gas Companies' Protection Association and certain of the large Gas Companies, the clause referred to (if we remember rightly) had not been introduced; and when it was, the Gas Companies, as ratepayers, had not any substantial ground for opposition so long as the stipulation was made that the electrical undertakings should keep separate accounts for this business, and that the income from it should be at least equal to the outgoings, though, truth to tell, we fail to see how this could be assured.

But the projected joint promotion started and agitated by the Incorporated Municipal Electrical Association, has not by any means been overlooked. The Gas Companies' Protection Association are keeping a watchful eye upon the movement; and, when the time comes, the Electrical Contractors' Association and the Ironmongers' Federated Association will, we think we may promise them, see that they have allies in the gas industry. But they must also see that their interests in the matter and the interests of the gas industry are essentially different, and that a joint case would not meet the attitude of the gas industry in the matter. We can quite imagine a condition of things in which a compromise might be effected, whereby the electrical contractors and the ironmongers would be satisfied; and then where would the gas industry be in a joint opposition? At the bottom of the hostility of the two bodies is the interference contemplated by the Bill (in empowering an extension of municipal trading) with the interests of their members as private contractors and traders in electrical fitting work and goods. The gas industry as represented by gas companies cannot claim this position, or put forward the same objection. Gas companies are large ratepayers; and their objection to the proposed measure is that, as such, they have already seriously suffered from the municipal administration of electricity supply undertakings, and as gas suppliers they have already suffered from having to compulsorily contribute to the support, through deficits and otherwise, of a competition with their own interests. They are therefore antagonistic to any extension of electrical trading powers. We can defy anyone to show where Parliament has created a more ludicrous and a more inequitable position than the one now occupied by gas companies in this respect. Fancy Parliament compelling (say) a local butcher to contribute to the support of the business, or to the making good of the financial deficits, of a competitor! If such a thing happened, it would be pretty safe to predict that we should not then be far from intestine war.

A curious thing is that these municipal authorities should be agitating for a united attempt to obtain their investment with electric wiring and fitting powers. We cannot understand why they covet them, seeing that so many authorities have burnt their fingers over them, through financial failure. The gas industry looks on this experience as offering substantial support to an opposing case from large ratepayers. However, it is pretty clear that the interests of the gas industry are not quite identical with those of the Electrical Contractors' Association and the Ironmongers' Federated Association; and that gas companies, if the Bill is persevered with, will have to stand separately, and present their case in their own way—at least, so we imagine. Though this be so, the two organizations named will find the gas industry shoulder to shoulder with them; and it may well be that the presentation of two cases will, in the circumstances, turn out to be better than one.

Changes at Liverpool.

In engineering and works management, the Liverpool Gas Company have been displaying much enterprise; and the results are showing themselves, in a very gratifying and substantial manner, in the accounts of the Company. Manufacturing and carbonizing costs have, in the last accounts, decreased by several thousand pounds, and distribution expenses, contrary to the usual experience in these times, have also receded. Yet the sale of gas has, in volume, represented a large increase. The Chairman (Mr. H. Wade Deacon), at the meeting of the shareholders last Tuesday, spoke of these, among many other, matters of interest, and said "the en- "deavour of the Directors had been to do everything in their "power to cheapen the cost of production, and so lower the "price at which they could afford to sell gas." That the cheapening of the carbonizing costs has been one of the aims of the Company has been particularly obvious during the past few years; and one of the best ways in which the "endeavour" of the Directors can be exercised in this connection is by continuing to endorse, and to give every possible encouragement to, the efforts of the Engineer and his staff in cheapening production and lowering prices. These are progressive times in which gas companies cannot afford to stand still; and it is largely due to what has been done on the works that the Company are able to announce a recession of 1d. from the 2s. 6d. per 1000 cubic feet at which the price of gas in the city has so long stood, and 2d. from the charge made to slot-meter consumers. And we see no reason whatever why the Liverpool Gas Company should not take a place in time among the few concerns standing at the very head and front in lowness of price.

The Company were united recently with others as promoters of the Standard Burner Bills. Participation in such a matter is a very proper action on their part, as there is in it evidence of a desire to break from the old conservatism that dominated the Company so completely for many years, and which conservatism, unfortunately for the Bill and for the co-promoters, was really at the bottom of a considerable part of the opposition produced, and consequently of the expense incurred. But the Company in the joint promotion were then ranked alongside Companies who, though far removed from the coal-fields, with heavy carriage to pay on the transit of their coals, and doing a very much smaller business, are supplying a lower illuminating power gas at the same price, and lower than that now charged in Liverpool, and—this is the main point—are giving complete satisfaction to their customers. With the success of the Standard Burner Bills, and the Liverpool Company still occupying their place among the promoters without the imposition of any condition as desired by their opponents, their future policy is clear; and we can foresee them in time supplying a gas of a calorific power ample for all purposes at a price that will be the envy of many other undertakings. And why not? Here is the Company with gas at 2s. 5d. of a grade in illuminating power that is perfectly useless for the purposes for which the bulk of the gas is consumed; and freedom from the fetish would mean a gradual

decline in price that would—big as the business in gas now is in the city—extend its service to the community in a marked manner. At present, money is being wasted there; and such waste is not good for the Company nor the community. However, we see the thin end of the wedge inserted in the old conditions and traditions. Another change is produced by the retirement of two officers whose names have been long and honourably associated with the Company. They are Mr. P. F. Garnett, the Secretary, and Colonel J. F. Robinson, the Treasurer. We wish both of them health and happiness to enjoy the leisure merited and earned by their extended years of activity and fealty.

The "Apotheosis" of the Horizontal Retort.

From most quarters, the intelligence comes that new coal contracts have been entered into at higher prices than last year, that oil contract prices are about the same or even a fraction lower, and that the prices of residuals are about being maintained, but, though new consumers and additional cooking-stoves and fires have been fixed, the level of gas consumption has not of late been raised (as much owing to economical gas-burners as to anything else) by such percentage increases as a few years ago. Despite these conditions, there are announcements from near and far of reductions in the price of gas having taken place from Midsummer, or—this in not a few instances—of definite promises of reductions at Christmas time. Looking into the cause for this, it is found that the financial positions of undertakings have been so considerably enhanced of late, that the reductions in price can be made without the slightest hesitation. Examining account after account, there is only one part in them to which credit can be given for an improvement which is nothing short of extraordinary; and that part is the one headed manufacture. "Extraordinary" is not too extravagant a term under the circumstances; it is indeed so extraordinary that one can hardly help feeling a constant current interest in it. Lessened coal consumption, lower totals for carbonizing wages, and higher makes per ton are all attributable to heavier charges and longer duration carbonization. And if the practice in this respect continues to spread as it is doing in the gas industry at the present time, we shall in all likelihood find, in the Board of Trade returns for these times, that the total annual coal consumption of the industry is possibly standing still—perhaps even receding—while the total gas consumption is still on the upward move. Economy of the kind is not only of industrial, but of national importance; and we hope when Professor H. E. Armstrong comes to contribute his paper to the proceedings of the British Association on "The Provident Use of Coal," he will make due note of what the gas industry is doing in this direction in these times.

And all this is being done with the horizontal retort. It was at one time thought the horizontal retort had come to the end of its possibilities in the matter of economy; but it is a case of the unexpected that has happened. While conditions existed that prevented the filling, or practically the filling, of the horizontal retort, while engineers refused to depart from custom to see whether anything of value lay beyond, the additional wealth to be derived from a horizontally equipped retort-house was completely hidden from sight. The many new types of machines for charging and discharging have been largely instrumental, through their capacity for placing heavier charges in the horizontal retorts, in producing the profitable revelation; and it is now interesting to hear of the instances in which the published records have hastened decision as to the scrapping of old plant and the putting in of new plant suitable for dealing with heavier charges, and through them deriving the largest possible profit from every ton of coal carbonized. It seems ages ago since we first heard Mr. H. E. Jones making his merited boast of the economical working of the retort-house machines devised by the late Engineer (now a Director) of the Wandsworth and Putney Gas Company, Mr. Henry S. Freeman. They were all that was claimed for them. But from the exceptionally interesting speech that Mr. Jones made at the meeting of the Company last week, we learn that at length these machines, applauded so highly in the past, are now giving way to newer invention, in order to secure the valuable gains (to which they were not equal) of modern carbonizing method. Progress means supersession in some form or other. Mr. Jones was never particularly enamoured of retorts inclined or retorts vertical; and with coal and labour economies and enhanced results from coal carbonized in horizontal retorts, he is now talking of their "apotheosis." It is rather a mouth-filling word; perhaps this makes it appropriate to the subject. However, there is no question that, if we do not exactly worship or deify the horizontal retort, it is far from disestablishment yet, and farther than it would have been had retort-house costs and gas production remained as but a few years since. We have said, and we repeat, that the revelations of gas companies' accounts under the head of manufacture have been extraordinary.

There are the effects. Reduction of price to consumers means, for sliding-scale companies, the right to higher dividends. These are also creeping up. The London and the Suburban Gas Companies (several of whom are working under the co-partnership system) are paying higher dividends to proprietors and higher bonuses to the worker co-partners—all through their ability to reduce the price due to the new experiences within the retort-house; and the advantages do not end there. Higher dividends have a marked stimulating effect upon the market values of gas stocks; and appreciation of the quoted values of British gas stocks in which there are open dealings has been a noteworthy feature of our Stock and Share List. The higher the dividend the lower the price of gas in the case of sliding-scale companies; and the lower the price of gas, the greater the assurance of decent dividends being maintained in the future. As Mr. Jones admirably puts it in the speech to which allusion has already been made, so long as proper attention is given to upkeep, there is nothing to be ashamed of in a high dividend—and the higher the better, because it reflects low price, a low capital, and good engineering and administration. The Wandsworth Company have a low capital; the ordinary price of gas is at 1s. 10d. (and lower for power) per 1000 cubic feet; dividends are on the three classes of consolidated stock respectively at the rates of £8 5s., £6 15s., and £5 15s. 6d. per cent. per annum; and last half year no less than 9·4d. per 1000 cubic feet was spent on upkeep. There is nothing to be ashamed of in high dividends when the world can be shown such a state of affairs. And there is fair promise that next year the price of gas will be lower still, and consequently the dividends will be higher. The Wandsworth Company deserve all praise for what they have done in making a record among the London and Suburban Companies; but the tendency in other quarters is in the direction of narrowing existing differences between themselves and the Company in the south-western corner of the Metropolis. There is one more point affecting the appreciation of the market value of gas stocks; and it is that it carries with it an increased premium on new issues of capital. This again is capital economy springing from the work that is now being done in the retort-house in adding to stability and value, and in helping to bring us nearer the period when gas will be as common as coal as a fuel on the domestic hearths of the country, and on account of its cheapness a still larger factor in artificial illumination than it is to-day, though now the largest. The position is as cheering and inspiriting as anyone could look for or desire.

Reconstruction of the Hamburg Holders.

We do not know whether to congratulate the Hamburg authorities on their decision to reconstruct the 7 million cubic feet gasholder that was the centre of the catastrophe last December, on the same lines as the one that was then wrecked—that is to say, with raised tank and a chamber or store beneath, through which goods trains can pass. Though the site is congested, it would have been fair expectation that, after the terrible and costly experience, there would have been a leaning, and an ultimate determination, to come down at any rate to ground-level for the bottom of the tank. That there has been a definite resolve to rebuild on the same lines seems clear from the papers of which translations are given elsewhere this week. But, as yet, it is uncertain whether the resolution has been arrived at prior to, or after, the report of the independent Committee of Experts who were deputed to inquire into the causes of the disaster. We can hardly think determination preceded report, though the document, to the best of our belief, has not yet been published. In the interests of gasholder engineering, and of future protection, it is to be hoped the report will not be relegated to the impenetrable archives of the Hamburg authorities and of the builders of the holder. But from the paper of Herr Scheuss, which was read as recently as last month, it is seen that the work of reconstructing this holder has

not yet commenced, and that the preliminary preparations for so doing will occupy some time. He also remarks that, naturally, in its reconstruction great attention will be paid to the arrangements, and a specially high factor of safety will be adopted in the structure. This is where the report of the Committee of Experts would be highly interesting and edifying, to ascertain whether or not, in their collective wisdom and expert knowledge, there was any deficiency in the "factor of safety" that was formerly deemed to be sufficient. However, on the measures now to be taken with the object of securing a specially high factor of safety, Herr Scheuss cannot speak until later; and this indicates that details will be published that will be comparable with those for the wrecked holder as given in the contribution that is published to-day.

The Fire at the Brussels Exhibition.

A CONSIDERABLE amount of intelligence was published during last week concerning the great fire at the Brussels Exhibition; but it was mainly directed to the devastating character of the conflagration, and to the immensity of the loss occasioned thereby. From it all, however, we have not got any nearer to a solution of the origin of the fire than we were when the paragraph was penned that appeared in our "Electricity Supply Memoranda" a week ago. The Belgian papers were at one in attributing it to a short-circuit, and so were the correspondents of the papers published in this country. It was not a case of a solitary newspaper man jumping to any conclusion in the matter; but practically there was unanimity. One correspondent did suggest that responsibility might rest with the firework display; but, no doubt for excellent reasons, the firework theory seems now to have been entirely abandoned. An attendant has since stated that the first thing he saw was a curtain in flames; but how the curtain became ignited is as complete a mystery as a good many other instances of spontaneous combustion of goods in places that—of course, there is no significance in the detail—are electrically lighted. But it is suggested that if the curtain incident is true it disposes of the short-circuit theory, although there is nothing to show why the curtain should not have been set alight by a fused wire as well as by any other means. There has been an almost general demand in the Press for a searching inquiry into the origin of the fire; and we hope there will be, though there seems to be, *primâ facie*, little chance of any positive result. However, as to that, we can only watch events, and trust that, both in the interests of at present criminated electricity and the safety of life and property, there will be some satisfactory disclosure.

There has also been much writing of a non-technical character touching the danger of constructing exhibition buildings, containing exhibits of such immense value—some almost priceless—and in which people congregate in crowds, in the gossamer vogue of the present day. These buildings are costly enough for their temporary purpose; but, though only for temporary use, they certainly seem far too fragile and combustible for the responsibility imposed upon them. At the same time, it must not be forgotten that it is not the buildings so much as the inflammable character of the goods housed in them that causes fire to rapidly spread, and supply fuel to, and thus vitalize more and more the consuming flames. Messrs. Arding and Hobbs establishment at Clapham was not a flimsily constructed place; nor were the premises in which the Accrington and the Brixton fires recently occurred. The only thing to be said in favour of more substantial exhibition buildings is that they might have some effect in confining fire. But even in such a case, with buildings stocked with inflammable goods, and intercommunication existing between the buildings, there would be no great assurance against fires swiftly reaching enormous proportions.

High Pressure Gas for Railway Lighting.

One of the—perhaps it is the—largest private installations of high-pressure gas lighting in this country at present is to be seen at the Brighton Central Station and Locomotive Works of the London, Brighton, and South-Coast Railway; and this week it is our pleasure to publish an extended illustrated description of the work. The system adopted is the Keith, with inverted lamps; and that it is there in this extensive form is due to the enterprise of the Brighton and Hove Gas Company and to the business attitude that the Brighton Railway Company adopt in connection with their lighting arrangements. Electric light was formerly the means of inefficiently lighting the large station, goods yards, sidings, and workshops; and when the Brighton Company considered that the electric lighting was not altogether satisfactory, and that improvement was required, municipal electricity—and municipal electricity is keen in Brighton—made a brave struggle to obtain the business. The fact of the extensive installation of high-pressure gas lighting is proof of non-success. It was a bitter pill for the local purveyors of electricity to swallow; but swallow it they had to, inasmuch as the Brighton Railway Company were fully persuaded, and the opinion is confirmed in the result, that in both economy and efficiency, though an inviting price was quoted for electricity, high-pressure gas lighting stood pre-eminent. It was a big win for gas, and a win that will carry influence in the future. An illustrated description of the installation ought to be introduced to the notice of every railway authority in the United Kingdom; and to carry the education of railway officials as far as possible, the gas engineer in every town should see to it that the chief representatives of the Railway Company or Companies there should be supplied with an account of what has been done at Brighton. It is a subject that should be talked about among railway men. Such an example of good work is an aid to gas in its strenuous contest with electricity for extensive lighting custom; it is also one of many proofs that gas is beyond all question, in the open field, the superior illuminant in regard to the two most powerful considerations of economy and efficiency. Details are set out fully in the special article in other columns; and the contrasts afforded by the photographs of the lighting by electricity before the change and the lighting now, will not be the least instructive parts of our pages this week.

Points from Croydon.

This year will stand out as an interesting one in the history of the Croydon Gas Company—it being the one in which the Institution of Gas Engineers paid the well-equipped works at Waddon a visit during the crowning week of the presidency of Mr. J. W. Helps, the Engineer and General Manager of the Company, and the one in which the members of the German Association who will be visiting this country in October will also be received by the Chairman (Mr. Charles Hussey) and the Directors—the Company's works being one of the few selected for a visit. Mr. Hussey, at the meeting of the proprietors (and the proprietors endorsed his remarks) rightly appreciated the honour that such visits confer, just as the visitors appreciate the honour conferred upon them in being permitted to visit works of such advanced technical interest as those at Croydon, all parts of which works breathe of the professional spirit and ability of their author. The encomiums of a competent body of judges stand for much in the justification of policy and selection; and the Croydon Directors, specially qualified in gas matters though the majority are, are not above feeling gratified at the endorsement of their and their Engineer's work from those capable of making the attestation. We will not say anything about the commercial affairs of the Company, except that reductions of price are in the immediate future to be enjoyed by the consumers. But we should like to direct the attention of all gas-works administrations to the broad-minded policy of the Board in regard to the co-operative work of the industry, as reflected in the Chairman's remarks upon extended support to the Sulphate of Ammonia Committee and joint advertising effort. There is one thing in Mr. William Cash's remarks that is also striking, and that is the rapid effect co-partnership has in promoting thrift among gas-works employees. The experience of Croydon is the experience of other places—that, when the spirit of saving gets hold of the men through the influence of co-partnership, they are not long in putting something by to add to their accumulating bonus and dividend. Sir George Livesey used to say co-partnership improved men. It does. The thrift of the man must have a bearing not only on his own interests, but on the affairs of his employers. No employer given the choice between a thrifty and a thriftless man, would select the latter.

Proposed Change in Decimal Punctuation.

At the time of the International Exhibition at St. Louis in 1904, an Electrical Congress was held, over which Professor Elihu Thomson presided. In the course of the proceedings, a resolution was passed, as the outcome of a paper submitted by

Col. Crompton, to the effect that steps should be taken to secure the co-operation of the technical societies of the world by the appointment of a representative Commission to "consider the question of the standardization of the nomenclature and ratings of electrical apparatus and machinery." The result was the formation of the International Electrotechnical Commission, which held a preliminary meeting in London in 1906, and its first formal meeting in the same city in 1908. Among other conclusions come to was one that the Commission should endeavour to arrive at a universal system of symbols. After the meeting in 1908, the Electrotechnical Committees of various countries proceeded with the work entrusted to them; and a formal meeting of the Commission is to be held next year, at which the work of the Committees will, it is arranged, be considered. On the invitation of the Belgian Committee, a conference has just been held in Brussels to compare the work done, and decide whether or not it is being carried out on suitable lines. A very interesting article on the subject, from an electrical correspondent, appeared in the Engineering Supplement to "The Times" last Wednesday, in which it was stated that the "practical value of the congress was apparent as soon as the proceedings began." We are not in a position to controvert the statement, but only wish to direct attention to one proposal which does not seem to us to be called for. Among the suggestions placed upon the agenda by the French representatives was one that a comma should be used "to separate the units from the decimals, to the exclusion of the full stop;" that is to say, that we should write 7,125 for 7·125. We fail to see any advantage to be gained by the proposed change. On the contrary, it would, in our opinion, lead to confusion; and we are pleased to find that the proposal was not pressed. If change is necessary, let it be by the abolition of the comma, and the universal adoption of the inverted full stop. It has been questioned whether anyone has ever been so stupid as not to recognize a decimal point because a comma was used for it. We venture to reply in the affirmative; for it was once stated, in a technical publication, that two towns were some thousands, instead of only a few, miles apart, because a translator had regarded the comma used as a decimal point as one employed in the ordinary way to mark off the thousands.

Glover-West Vertical Retorts for Australia.

The Australian Gaslight Company, Sydney, have placed a contract with West's Gas Improvement Company, Limited, for a complete installation of Glover-West vertical retorts. The contract comprises a retort-house building suitable for accommodating fourteen benches of retorts, eight retorts in each bench. The carbonizing capacity of the retort-house will be approximately 3½ to 4 million cubic feet of gas per day. Half of the retorts—namely, 56—are to be erected at once; and the contract comprises the whole of the necessary fittings and equipment for this number. This is the first installation of vertical retorts to be introduced into Australia.

Sulphate of Ammonia in Germany.—The United States Consul at Frankfort has forwarded a brief report on the use of sulphate of ammonia by German farmers. He says the consumption has increased from 284,000 metric tons in 1908 to 330,000 tons in 1909. He adds: "The consumption of Chile saltpetre was about 450,000 metric tons; so that, as far as the percentage of nitrogen is concerned, ammonia is already a trifle ahead of saltpetre." The "Journal of the Association of German Engineers" states that the developments in the last ten years point to the fact that in the near future ammonia will chiefly be used as an artificial fertilizer. Statistics show that Germany consumes its entire yearly production of 322,700 tons at home.

Protection of Water Supplies.—In the "JOURNAL" last week, we gave the conclusion of our report of the proceedings of the Joint Committee of both Houses of Parliament to whom was referred the Water Supplies (Protection) Bill. The report of the Committee, which was given in a previous number [see *ante*, p. 280], has now been issued, with the evidence of the witnesses examined, as a Blue-Book. It may be remembered that the Bill proposes to restrict the powers of authorized water undertakers in the following ways: (1) By preventing the acquisition of fresh supplies without specific parliamentary authority; (2) by rendering the undertakers liable to give compensation for injury to private supplies caused by their works; and (3) where water is taken from one district to supply another, by conferring on the local authorities of the districts from and through which the water is taken the right to demand a supply from the works of the undertakers on terms to be agreed or fixed by the Local Government Board. The Committee unanimously resolved to report the Bill without amendment.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 535.)

THE Stock Exchange had an unusually dull and uninteresting week. The long nineteen-day account was decidedly unpopular; and members seemed pretty well tired of it before it was half-way through. There were many absentees on the opening day. Some markets were almost deserted; but the Consols Market showed signs of life. Starting weaker than it had closed the Saturday before, prices fell to 80 $\frac{15}{16}$. But a sharp recovery set in, and 81 was marked before the finish, the quotation showing an advance. Most others were uneven, and the speculative lines were easier generally. Tuesday was an idle day; but the tone was better. Consols rose another ⅛; but Rails lacked support. Americans were firmer. Business was as quiet on Wednesday; but some prices advanced a little. Government issues were hardly so firm, and Rails languished under neglect. Americans and Foreign were firm. On Thursday, the continued absence of business became almost oppressive, and there was hardly enough to move prices at all. Friday was as bad; and many members went away, as the Exchange was to be closed the next day. The Consols and Railway Markets were practically unchanged, but Americans showed weakness. In the Money Market, there was a fair demand; and rates both for short loans and for discount hardened and closed at an advance. Business in the Gas Market was about what might be expected at this time of the year—the aggregate being only moderate. But everything was very firm, and a fair number of quotations improved. In Gaslight and Coke issues, the ordinary was strong and advancing. On the opening day, 104¼ was marked; but this was soon left behind, and 105½ was the price before the close—a rise of ½. In the secured issues, the preference realized 102½ and 103½, and the debenture 81½ and 81¾. In South Metropolitan, there was one bargain at 120⅞; while the debenture changed hands at 79½ and 80¼. In Commercial, there was only one transaction—viz., 106½ for the 4 per cent. Among the Suburban and Provincial group, Alliance and Dublin was done at from 81 to 82, ditto debenture at 97, British at 44½ (a rise of ½), Brighton original at 215½, ditto ordinary at 155, Bromley "B" at 88½ and 89½, Hastings 3½ per cent. at 94½, Ilford "B" at 115½ (a rise of 3), and Southampton at 110½. On the local Exchange, Liverpool "A" marked 219. In the Continental companies, Imperial changed hands at 177 and 177½, Union at 91½ (a rise of 3), and European fully-paid at 23¾ and 23⅞. Among the undertakings of the remoter world, Bombay was done at 6⅞, Buenos Ayres at 97¾, Monte Video at 12½, Primitiva at 7¼ and 7⅜, and ditto preference at from 5 $\frac{3}{16}$ to 5¼.

ELECTRICITY SUPPLY MEMORANDA.

Electrical Cooking and Heating—Experience and Time Publish the Truth—"Meteor" Staggers under a Load of Hard Words—Marylebone Hawkers—Effect of High-Efficiency Lamps on Output—Power Companies as Non-Dividend Paying Concerns.

WHAT has become of domestic electrification? We have heard precious little about it lately; and in all our travels, we have not yet gone into a single house—except an electricity show-house—where electric cooking stoves are in use. It must have been an ugly blow to electricians to have read the statement of the Right Hon. John Burns—a name that suggests heat by combustion rather than by electrical means—when the smoke abaters were before him, that the two largest Gas Companies in London had between them no less than 1,300,000 gas-heating appliances of which they had cognizance in use in their areas; while the electricians had only—well, Mr. John Burns was kindly considerate, and omitted to mention the number of cooking, water-heating, and other similar appliances that the electrical suppliers in the same area have in use, and from which use the householders suffer. But it passes strange there should be this silence, and this want of popularity in regard to electrical appliances; inasmuch as the electrical press and central station advertising literature have times out of number given their word of honour that all such appliances have been brought to a pitch of perfection that has made them the equal of gas appliances in economy and cleanliness, and that this is due to the complete utilization of the heat generated. Especially is this the reputed case in electric cooking-stoves containing ovens, because there is no radiation from them. There has been a great deal of contradictory assertion on this point through some electrical writers being dishonest and a few honest. Among the honest writers is Mr. M. Farrer; and he has had a turn at telling the truth in the "Electrical Review." He treats very brusquely the mythical claims as to the superior economy of electricity over gas, and that miraculous construction of electrical goods that causes all the heat to be usefully employed without loss. Says Mr. Farrer: "We cannot at present compete against gas as regards cost alone. Therefore, the only way to make electrical cooking popular is to make it, as it can be made, far more convenient and cleanly than gas cooking." We do not see where the extra convenience and cleanliness in cooking is to come in. But there must be a little charity; and our electrical friends ought to be allowed the modicum of comfort

to be derived from thoughts of a possible—not accomplished—excellence in the matters of convenience and cleanliness.

It is not only that the claims to a supereminence in economy and efficiency have been proved to have been ill-founded, but, in the matter of detail, the designers of electrical appliances seem to have an entire misconception as to requirement. Mr. Farrer does not say a "misconception;" he is a little more caustic, and describes it as a "want of common sense." A few examples will not be amiss. He knows of one electric kettle so designed that, as soon as it begins to boil, water is blown violently out of the spout, soaking everything in its immediate vicinity. This kettle which shows such ebullition of feelings over its performances is also so designed that it scorches anything upon which it is stood. Then, again, there is the switch difficulty; and every utensil, it is advised, should be fitted with a substantial switch of ample carrying capacity. Breaking the current by pulling the sockets off the terminals is a very crude method; but it is the only safe one under existing conditions, although liable to burn the fingers. Flexibles, too, should be covered with fireproof material. Heat regulation seems to be a matter entirely ignored by a large number of makers; and this results in wasteful consumption. All these points, says Mr. Farrer, tell against electricity in competition with the "well-known" convenience of a gas-stove. We are obliged to him for the "well-known."

Passing on, Mr. Farrer states that he has in use a Phœnix grill, which, in its way, is a practical article. A controlling switch would be an improvement; the plug tops soon getting too hot to touch. An early pattern Wilkinson cooking-stove was made for 700 watts; but this did not give sufficient heat. It was, in fact, more useful as a radiator than as a cooking-stove. But recently a new 1000-watt stove has been put into use; and excellent results have been obtained from it. Most of us have different notions as to what constitutes "excellence." It is a much abused term; and the performance of a heating appliance that a gas man might turn up his nose at, an electrician might describe as "excellent." We see, however, that with this Wilkinson cooker, it is most important that the top of the stove should be completely covered with whatever utensil is in use, as otherwise so much heat is radiated away. A word of caution is necessary with this stove when it is completely covered, because the whole body becomes extremely hot; and unless it is stood on a stout metal tray, it burns anything under it. Mr. Farrer finds the G. E. C. oven a success; but considerable trouble has been experienced with the two hot-plates on the top—due to the fact that they are not sufficiently protected from water, &c., that boils over, and they consequently break-down to earth after about three months' use. With the oven, it is necessary to have the current full on (1000 watts) for a quarter of an hour before, to half an hour after, commencing cooking, when it can be reduced to 700 watts. With reference to the boiling of water, Mr. Farrer says the Phœnix grill took 18 minutes to boil 1¾ pints in an aluminium kettle with a consumption of 0·3 unit; the Wilkinson stove boiled the 1¾ pints in 14 minutes; and three pints in a patent "Kwik" kettle in 23 minutes. We have all heard of the patience of Job. As we write recollections come of the rubbish that has appeared in print as to the perfection in economy and utility of electrical appliances for cooking and heating. With time truth prevails.

After writing the above, the pages of the "Electrical Times" were turned to; and we found a correspondent, covering his identity under the *nom de plume* "Iconoclast," saying nice things about domestic gas cooking apparatus, and very nasty things about domestic electrical apparatus—"abortions" he calls them. This writer owns up to being an electrical canvasser; and so—travelling daily the rugged ways along which he gathers experience, which causes him to speak out plainly—he ought to know of what he is talking. "Meteor" comments half-heartedly on "Iconoclast's" letter. He has not the courage to say there is no truth in this man; and yet he cannot (with the ghost of a Domestic Electrification Number bidding him refrain) acknowledge that all his correspondent says is true. "Meteor" takes the middle course by saying that he does not believe the charges levelled against such apparatus will apply to all. Then how is it the perfect apparatus does not "take on," push the imperfect goods out of the market, and create a big business other than for lighting for the central stations? Less than twelve months ago "Meteor" was talking windily of domestic electrification producing a state of positive blessedness throughout the land, of milk-and-honey, of Promised Lands, and so on. Now "Iconoclast"—the canvasser, the man with practical knowledge, the man who has come into contact with those who have tried these things and will not have them at any price—comes along and shows up the cobwebs behind the pretty gossamer covering produced by the penman of the "Electrical Times." "The electric oven," we read, "is a rough, ugly, gimcrack box of sheet iron, or tin, and would pass as the offspring of a sanitary dustbin, crossed with an old biscuit tin." Servants, too, have to keep their mouths closed, lest they blow the switches off. He is certain it would be good business for the gas companies to subsidize the makers of this rubbish. Electric grills and flat-irons come under his cutting censure. His last sentence has a thoroughly comprehensive appearance. Here it is: "What is being produced at present is the most expensive, inefficient, thoroughfaced hopeless rubbish that any industry has ever had tacked on to it." We had better turn from the subject.

"No hawkers or circulars" is a legend that is seen neatly printed on an equally neat plate affixed to the gates of many suburban residences just now. The plates (which, neat though they be, strike us as being a bit incongruous) are said to be effective; but the hawker and the tradesman who have to cultivate their businesses by being a nuisance, have been meditating with full souls over the degenerating benevolence of the British householder and the general inclination to crustiness of the human race. A letter by "Householder" in "The Times" brings those plates to mind; and we are wondering whether they would be effective against the Marylebone Electricity Department whose "enterprise" has now stepped beyond the bounds of decency, and whose business getting work is a nuisance to the householders in the district. A start has been made by the department in hawking electric flat-irons; but we have not yet seen that the Borough Council have taken out a hawkers' licence for Mr. Seabrook, Mr. Holmes, or any other members of the staff. The *modus operandi* in the new work is thus described by "Householder:"

> A parcel and letter were this morning handed to my servant, and, of course, taken in. The messenger vanished without waiting for a reply. The parcel, judging by the several addresses erased from the cardboard box, had been already left at other houses; it contained an electric iron. The letter was full of printed matter pointing out the advantages of this machine, and the use of electricity. The iron was to be left at my house for a month, and then I should have either to pay the price set upon it, or hand it back to the messenger, who would call. I was not given the option of otherwise refusing these "advantages."

The prospect of what this sort of thing might lead to if encouraged by householders seems to scare the correspondent of "The Times." If private traders follow this example of the municipal traders, our houses may become warehouses for unsolicited goods, and our servants be occupied resisting demands for money or for a return of the parcels left. There is no end to the vista of "advantages" and of demands that may be made on our house room and patience. Old clothes dealers might favour us with the loan, on trial, of their stocks; and even fishmongers, fruiterers, butchers, and greengrocers might have on Saturday nights a chance market for perishable goods that they had been unable to sell. A question will no doubt be raised in the Borough Council regarding this prominent complaint as to a fresh ill that the householders of Marylebone have been called upon to bear in the interests of municipal trading.

That new conditions are coming over electrical undertakings is apparent on every hand; and unless the latter are specially favoured, those conditions will make a vast difference in the relation of financial result to the business done. The "Electrician" has given prominence to some rather remarkable statistics respecting Leeds. New consumers, it is stated, continue to be connected with the mains at a very satisfactory rate; but nevertheless the output of energy remains almost stationary—there being practically no difference between the number of units sold during last financial year and two years previously, although the sales (at lower prices than the lighting units) of current for power and heating have in the period increased by upwards of 1 million units. This causes one to turn to the revenue from private lighting, as it is obvious that, with this increase in one department, if the total output is only now what it was two years since, there must have been a big leakage somewhere. It is found that private lighting income is no less than £16,410 below what it was two years ago—£64,518, compared with £80,928. That is a substantial difference. New consumers are being constantly obtained; but they do not afford compensation for the factors that have contributed to the reduction of the consumption of lighting units. There is a proneness to give the metallic filament lamp the credit for all the saving; but, at any rate at Leeds, there is another movement operating, and that is lessened consumption of electricity proportionately to the number of lamps fixed. There appears to have been a careful inquiry into this matter. In 1907-8, the number of units sold for private lighting per 35-watt lamp installed was 21¼; last year the figure had declined to 17⅞ units. There are a not inconsiderable number of electricity consumers in areas with which we are more especially acquainted who, on adopting electricity, retain their gas-fittings, and use them alternately according to the season—the gaslights in the colder weather. With the big improvement there has been in gas lighting through the inverted gas-burners, there is a strong temptation on the part of such consumers to patronize to a larger extent the system of lighting that they find the more economical and efficient. Perhaps this experience is not unknown in Leeds. At any rate, the figures quoted are not only interesting, but most significant.

It is commonly said to-day, as it has commonly been said by a long line of ancestors, that it is never safe to prophesy. But there is one thing over which one does not hesitate much in indulging a little in this direction; and that is that it will be a long time before another electrical power company can get capital from the public with which to start operations. The wreck of the South Wales Company is fresh in memory. Occupying the choicest of districts, the Lancashire Electric Power Company is not yet in a dividend-paying way, and not likely to be for a very long time. The business has more than doubled during the past four years; but even in 1909 the units generated only amount to 9,251,831, while the receipts and expenditure show merely a difference of £130 in favour of the former—£15,294, against £15,164. Economies at the generating station, including a favourable coal contract (favourable coal contracts cannot be relied upon just now), helped last year in causing the expenditure to keep within the line

of receipts. The cotton trade was not in favour of the Company in 1909; but there is a hopeful eye cast in the direction of the collieries within the area of supply. The Company have taken over quite a number of Orders from local authorities; but there was not a cheerful ring in the voice of the Chairman (Mr. H. F. Parshall) in referring to these the other day at the meeting of the shareholders. He looks for a certain amount of growth from the Orders; but the business is not large in volume. On the other hand, the amount of capital required is not considerable; and the return per unit is higher than in most classes of industrial supply. The year's netting of Provisional Orders from local authorities include Abram, Aspull, Burton (Rural), Bury (Rural), Kearsley, Little Hulton, Little Lever, Ramsbottom, Tyldesley, Westhoughton, Whitefield, and Worsley. We think the Chairman is about right in considering that the business will not be large in volume. Certain it is these authorities would not have parted with their rights if they could have strained themselves into the belief that there was money in the supply of electricity in their districts.

THE VISIT OF THE GERMAN ASSOCIATION.

Programme of Arrangements.

In previous issues of the "Journal," reference has been made to the visit to be paid to Great Britain by members of the German Association of Gas and Water Engineers early in October next. The current number of the "Journal für Gasbeleuchtung" contains the programme drawn up for the occasion, which furnishes the following particulars. On Monday, Oct. 3, the party will leave the Westminster Palace Hotel at 9.30 a.m. by motor for the Beckton Gas-Works, where they will be received by the Governor (Mr. Corbet Woodall) and Directors of the Gaslight and Coke Company, and the most interesting parts of the works will be inspected. They will return to London by motor, and visit the works of the Company at Kensal Green and Fulham. At the former, the Fiddes-Aldridge charger-discharger machine will be on view; and at the latter, the Woodall-Duckham vertical retort for continuous gas production. In the evening there will be a reception and banquet by the Institution of Gas Engineers, probably in the Hotel Cecil. Next morning, a visit will be paid to the works of the South Metropolitan Gas Company at East Greenwich, where the Arrol-Foulis hydraulic charging machine and the Company's special types of charging and discharging machines will be inspected. There will afterwards be a reception by the Chairman (Mr. Charles Carpenter) and the Directors. The party will then motor to the Croydon Gas-Works, where they will see West's charging-machine, with apparatus lately invented for charging and discharging; also special arrangements for handling coke with Marcus coke-conveyors. The evening will be left free; but special arrangements may possibly be made. On the 5th, the party will leave by the 11.50 p.m. train for Edinburgh, where they will arrive about 8 a.m. next morning. Between 9 and 10 o'clock they will leave to visit the works of the Edinburgh and Leith Corporations Gas Commissioners at Granton. After luncheon, at which the Lord Provost of Edinburgh will be present, there will be a short visit by motor to the Forth Bridge, returning direct to Edinburgh in order to leave for Glasgow about 5 p.m. In the evening, a dinner in honour of the visitors will be given by the Corporation of Glasgow—the Lord Provost presiding. On Friday, visits will be paid to the Tradeston and Provan Gas-Works of the Corporation; and the party will leave Glasgow by the afternoon train, arriving in London at 10.45 p.m. It is proposed next day to invite the visitors' English hosts to luncheon, at which there will be an opportunity of thanking and taking leave of them. The return journey will be commenced on Sunday, Oct. 9; the departure from London being at 9 a.m., and the route being *viâ* Dover, Ostend, Brussels or Lüttich, to Cologne. The programme leaves the visitors Wednesday and part of Saturday entirely free, so that they can see anything of interest to them in London. An offer has been made to arrange for a visit to the Japan-British Exhibition, if a large number of the party so desire.

Lighting the Public Streets on the Slot-Payment System.—Noticing the arrangement referred to in last week's "Journal," p. 463, the "Evening Standard" a few days since remarked: Local authorities may take a hint offered by those in charge of the village of Jocketa, in Saxony. In this village, as in many another in England, the folk retire early, leaving their hamlet almost deserted. Not quite, however. There are business men of the neighbouring town of Plauen who have villas at Jocketa; and, when trade is good, they may be late in returning home. There is also, of course, the occasional but inevitable passage of vehicles; and we may hazard the guess, though we do not know Jocketa, that the reveller, albeit unusual, is not an unknown apparition. In short, the authorities were confronted by the usual problem of little towns; they were compelled to put themselves to the expense of keeping the streets lighted for the convenience of a handful of residents. They have now found an ingenious way out of the expense. Slot machines have been attached to certain lamp-posts. After eleven o'clock, the lights are turned off; but the insertion of a coin in one of the boxes relights half the town, and the insertion of two fills every lamp with glory. The system sounds simple, efficient, and eminently just; the light is paid for by those who need it.

COMPREHENSIVE GERMAN TEXT-BOOK ON GAS.

Less than three years have elapsed since we had the pleasure of reviewing the second edition of Herr A. Schäfer's text-book on the "Equipment and Operating of a Gas-Works," which forms one of the series of technical hand-books published by the house of R. Oldenbourg, of Munich and Berlin. The fact that a new edition has been called for within so short a space of time indicates that Herr Schäfer's efforts to provide a compendium of the plant and processes adopted in gas manufacture have been well appreciated. The name of Dr. Witzeck, a chemist whose assistance had been acknowledged in the preface of previous editions, now appears on the title-page as collaborateur with Herr Schäfer. The new edition is considerably larger than the last, which again constituted a very marked enlargement on the first edition. The present volume comprises 923 pages, as compared with 751 pages in the second edition; while the number of illustrations also has been correspondingly increased.*

The first chapter relates to coal. The origin and classification of coal are referred to, and then follow descriptions of methods for the analysis and the valuation of coals for gas making. The analytical methods recommended do not generally follow those of the Committee of the American Chemical Society, which are now pretty widely accepted as standard, except perhaps in Germany, where we think they have failed to receive the recognition they deserve. The results of the investigations made at the Carlsruhe Instructional and Experimental Works on the principal varieties of German gas coals are reported fully; and no doubt in his next edition Herr Schäfer will include also the results of the investigations on typical English coals which are being carried out at the same institution, and on which a preliminary report has recently been issued. ["Journal," Vol. CX., p. 961.] At present, the book does not contain much about English gas coals, probably because the author appears to have gleaned his information almost wholly from German authorities and journals.

The second chapter treats of retort-settings. The subject of furnaces and producer firing is, on the whole, very well dealt with by reference mainly to the researches and lectures of Bunte and Geipert. A diagram (fig. 44) for calculating the efficiency of furnaces from the proportion of carbonic acid in, and the outlet temperature of, the flue gases, to which reference is made in the text, has been omitted from the copy of the book which is in our hands. Similarly, we have been unable to find three diagrams for computing the volumes of gas which will pass through mains of various sizes and of various lengths with different falls of pressure, as referred to on p. 851 of the book. The subject of vertical retort-settings is naturally much more fully handled than in the previous edition. We notice that the statement is made that the make of gas with these settings does not exceed that obtainable with horizontal or inclined retort-settings well operated.

The only type of vertical retort-setting spoken of is the Dessau; and, somewhat curiously in the light of the recent development of this type, by which 18 retorts are included in one setting, it is strange to find the author saying that ten is the most suitable number of vertical retorts for a setting. There is a new section on large chamber carbonizers, of which the Munich type of inclined chambers receives exhaustive treatment; and the Koppers' horizontal chambers are briefly described. The Klönne and other types are passed over. But perhaps the most serious defect of this chapter is the omission to refer to the Woodall-Duckham and Glover-West systems of vertical retorts. Methods of gas analysis and pyrometry for the control of the working of retort-settings are fully and fairly satisfactorily described. Several important and valuable types of charging and discharging machines for horizontal retorts have escaped notice.

The third chapter is on coal and coke conveying plant, and storage arrangements. Though comparatively brief, it is well worth perusal by English gas engineers, because it will help to show the differences between the types of conveying plant which are in vogue in German and English gas-works, and to indicate the great extent to which relatively costly equipment has of late years been adopted in the former. The fourth, fifth, and sixth chapters treat respectively of condensers, exhausters, and tar-separators, and will not prove specially instructive to the English gas man, except in so far as they indicate the departure which has been made by German makers of gas plant from English patterns. The seventh chapter relates to naphthalene extraction; and we notice that the author speaks most favourably of a crude carbolic tar oil as an agent for use in naphthalene washers. He disparages petroleum oil for the same purpose; but we think unjustly. Both the solar oils commonly used in this country in the manufacture of carburetted water gas and distillates from water-gas tar are superior to almost all coal-tar oils as solvents for naphthalene; but they are less well known in Germany than here, and probably have not been fairly tried there in naphthalene washers.

The eighth chapter deals with washers and scrubbers for the extraction of ammonia from coal gas, and the ninth chapter with the composition, analysis, and working-up of gas liquor. Then

* "Einrichtung und Betrieb eines Gaswerkes." Ein Leitfaden für Betriebsleiter und Konstrukteure bearbeitet von A. Schäfer, Direktor des Städt. Gas- und Wasserwerks zu Ingolstadt. Unter Mitwirkung von Dr.-Ing. R. Witzeck, Chemiker. Dritte vermehrte und verbesserte Auflage. Mit 413 Abbildungen und 8 Tafeln. Munich and Berlin: R. Oldenbourg; 1910.

follows an important chapter on purification. Oxide of iron, either in the form of bog ore, or of an artificial preparation such as Lux material, is used in Germany as a purifying agent to the almost absolute exclusion of lime and Weldon Mud. Chapter eleven treats of station meters. At the close, the rotary type of meter is described. Its advantages and limitations are fairly set forth; but we do not see that the author has mentioned the name of the inventor in connection with it—an omission which is scarcely fair to the latter. The twelfth chapter refers to gas-holders, of which types of construction protected by comparatively recent German patents are described somewhat fully. Particulars are given of the 7 million cubic feet holder erected in 1908 and 1909 at the Grasbrook works at Hamburg; but there is no mention of the catastrophe which occurred to this holder on Dec. 7 last. [The preface to the book is dated December, 1909; but it did not leave the publishers' hands until last June.] The next chapter is a short one on station governors.

The fourteenth chapter deals with water-gas manufacture. Four types of plant are here described—viz., the Humphreys and Glasgow, the Strache, the Dellwik-Fleischer, and the Kramers-Aarts—and the information given is, generally speaking, quite satisfactory. The next chapter—on gas supply to distant places—should be interesting to English readers, because there has been a greater development in this direction in Germany than in this country in recent years. The sixteenth chapter is a very comprehensive one, referring to the physical and chemical methods of control of the working of a gas-works. It includes gas analysis, calorimetry, and photometry, and, from the German standpoint, may be considered adequate and good. Naturally, much that is said is not directly applicable in English gas-works' laboratories, because of the differences in standards, weights and measures, and forms of apparatus. The seventeenth chapter is on distribution, and gives the usual formulæ for calculating the sizes of mains required. But, as already mentioned, some diagrams appear to have been inadvertently omitted in connection therewith. The eighteenth (and last) chapter is a short one on the size of works and plant required for the supply of gas to a district having a certain population. Appendices give the atomic weights of the elements and some other useful data; and the book concludes with a rather inadequate index.

We have endeavoured in the foregoing to give an impression of the scope of Herr Schäfer's work. It appears to us to be almost solely a compilation from published particulars, nearly wholly of German origin, to which the author has added little from his own experiences. The latter, in a small works such as that of Ingolstadt, are likely to have been somewhat limited. But, on the other hand, the author has probably been free to devote to compilation more time than the manager of a large gas-works. Hence the result is, on the whole, satisfactory; and we can heartily commend the book to English gas men who wish to learn what are the present methods of equipping and operating gas-works in Germany.

BLUE WATER GAS v. CARBURETTED WATER GAS.

Experience in Amsterdam.

By J. van Rossum du Chattel, Chief Engineer and Manager of the Amsterdam Municipal Gas-Works.

There are still some questions connected with the gas industry which have not been completely cleared up—not so much for want of information, but because the information has reached us from so many sides. A fair comparison between the figures has been somewhat difficult; for the circumstances under which they were secured were so different. This refers in especial measure to the old question of which is the cheaper—blue or carburetted water gas.

Now, the Amsterdam Gas-Works are possessed of both types of water-gas plant—one at the Western works (blue water gas, made under the system of Kramers and Aarts) and one of carburetted water gas (Samuel Cutler and Sons' arrangement) at the Eastern works; and so we are well in the way to give some useful information. Both works are under the same general direction; both were built in the same style; both are of the same size; and the quantity of gas they have made is (if not equal) at any rate practically equal—the difference being too small to exercise any influence on the cost price of the gas. Both plants were really erected under the impression that for both systems of making water gas much was to be said; and that after a sufficient period of time we would be able to decide upon their relative merits. No trouble was therefore spared to put the two works in the same condition, so that a fair comparison might be possible.

It may therefore be interesting to give the figures which we have found over the last four full years of working; both plants being erected and started to work in 1905. I may premise that the percentage of water gas (blue or carburetted) mixed with the ordinary coal gas is from 25 to 30 per cent. at the utmost.

The figures, of course, have the same basis of cost prices—viz., the cost of coke for both plants is the price at which it has been sold every year under large contracts, but lessened by all the extra labour, cartage, &c.—thus leaving a "net profit price." Wages for labourers are, of course, the same in both works. The mixed gas is carburetted with benzine in "Bamag" evaporators at the Western works; while at the Eastern works Solar oil is used from different places of origin—Texas, Roumania, &c. The price of the oil has lately gone down very much; but this has also been the case with the benzine used at the Western works.

Formerly there was still a certain quantity of benzol used at the Eastern works for carburetting the mixed gas. This, however, is not done any more; the Solar oil being used to correct any want of illuminating or heating power of the mixture, as its cheapness renders it preferable for this purpose to any other means.

The figures below leave no doubt whatever that, under the

Cost Prices of Water Gas per 100,000 *Cubic Feet.*

—	Western Works (Blue Water Gas).				Eastern Works (Carburetted Water Gas).			
	1906.	1907.	1908.	1909.	1906.	1907.	1908.	1909.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Coke for generators	1 10 11	1 15 11	1 13 4	1 11 10	1 13 9	1 16 4	1 16 1	1 10 3
Fuel for boilers	0 3 11	0 3 9	0 5 3	0 6 2	0 7 4	0 8 8	0 8 5	0 6 9
Wages for gas makers, engineers, and firemen	0 11 5	0 11 4	0 10 5	0 10 9	0 10 3	0 10 7	0 10 9	0 10 1
Purification (including wages)	..	..	..	..	0 1 10	0 0 11	0 0 11	0 1 3
Carburation	2 18 2	3 5 3	3 5 1	2 19 6	2 15 5	2 5 11	2 8 5	2 17 3
Repairs	0 6 4	0 8 11	0 7 1	0 6 6	0 3 8	0 5 8	0 5 7	0 5 7
Oil, lubrication, &c.	0 0 4	0 0 4	0 0 4	0 0 5	0 0 5	0 0 3	0 0 4	0 0 3
Gas	0 0 9	0 0 8	0 0 7	0 0 9	0 0 5	0 0 5	0 0 4	0 0 5
Sundries for manufacture	0 1 4	0 1 4	0 1 6	0 1 3	0 1 4	0 1 2	0 1 3	0 1 1
Written off, 4 per cent.	0 7 0	0 7 3	0 6 10	0 7 1	0 6 3	0 5 8	0 5 8	0 5 10
Interest, 4 per cent.	0 7 1	0 6 8	0 6 1	0 5 11	0 6 5	0 5 6	0 5 5	0 5 5
	6 7 3	7 1 5	6 16 6	6 10 2	6 7 1	6 1 1	6 3 2	6 4 2
Less water-gas tar	..	..	..	..	0 3 5	0 5 6	0 9 10	0 12 1
					6 3 8	5 15 7	5 13 4	5 12 1
Average price of coke per ton	1 0 6	1 1 2·5	1 0 2	0 18 6	1 0 3	1 1 3	1 0 2	0 18 6·5

Amsterdam circumstances (and, as I believe, under nearly most others), the blue water gas comes dearer than the carburetted water gas.

The difference between the cost price of the two gases was small in 1906—due to different circumstances, such as our using a cheap coke dust in the Western works, which afterwards was not further available on the same scale, and using less benzine. The gas had not then completely reached the desired calorific power, and we were obtaining a less perfect tar-extraction at the Eastern works. After this period the conditions became more accentuated; so much so that no doubt now remains on the question as to which of the two systems is preferable.

Another question which has presented itself and has been discussed already many times before, is whether with cold weather in winter the benzine does not deposit. In the first year, our experience was really not unfavourable; but in 1907 (as I had always anticipated and expected) condensation occurred in the mains in rather considerable quantities. It was not only in the mains, but also in both the dry and wet gas-meters. We use, of course, for our production of gas large quantities of benzine at the Western works—a total quantity of 1,767,482 kg., of a specific gravity of 0·740, being used in 1909. Stranger still, we do not find condensed benzine vapours only in the cold season, but even in summer; and no doubt is any longer possible on the question as to whether or not the benzine falls out. The emphatical answer is that it does fall out, not in small, but in rather large quantities,

SPECIAL COAL GAS FOR INFLATING BALLOONS.

It was reported in the "Journal" last year (Vol. CVII., p. 311, Vol. CVIII., p. 180, Vol. CVIII., p. 533) that some experiments had been made at the Dessau works of the German Continental Gas Company on the production of a special gas for inflating balloons; and a report on the same was submitted to the Aeronautical Congress at Frankfort-on-the-Maine in September last. Since that time, investigations have been continued with a view to the regular employment of such gas for charging balloons; and Dr. W. von. Oechelhaeuser, the General Manager of the German Continental Gas Company described the progress in a communication to the "Journal für Gasbeleuchtung" for July 23.

The raw material for the production of the special gas is ordinary purified coal gas; and further experiments have disclosed the interesting fact that its decomposition takes place quite as well, or rather better, in horizontal retorts than in the vertical retorts which were first used for the purpose. This fact is explicable through the greater ease with which a uniformly high heat may be maintained throughout the whole length of the retort when it is set horizontally. The gas produced must be collected in a gasholder, in order that the balloons may be filled rapidly. A single setting of horizontal retorts serves to produce 42,380 cubic feet of balloon gas in twenty-four hours; and a setting of ten vertical retorts will produce three times this quantity in the same time. It will thus be seen that the make of gas per hour is comparatively low, and falls off at times through the loss of time in renewing the coke in the retorts and raising the new charge to incandescence. Scarcely any gas-works would be prepared to keep a special holder for balloon gas, having regard to its relatively small use; and, consequently, the process is only readily applicable in works which have several gasholders, one of which can be relegated in the summer months to the purpose of storing a special gas. At Dessau, a holder of 120,000 cubic feet capacity is used for the purpose. It is necessary that the water in the tank of the holder should not give up heavy hydrocarbons to the prepared gas; and therefore a thin layer of oil has been spread on the surface of the water in the holder at Dessau. Clean water in the tank would, however, not require this.

The laboratory experiments last summer showed that the rate and completeness of the decomposition of coal gas depended not only on the temperature, but also on the amount of heated surface to which it was exposed. Increased pressure was of no advantage. It was found best to pass the gas through a highly-heated retort, packed with coke or charcoal, at a pressure of 0 to 2-10ths of water. A higher pressure caused loss of gas; while a lower pressure caused the gas to become contaminated with flue gases. Charcoal was at first used as the filling material, but afterwards small coke was found quite satisfactory. With horizontal retorts it was sufficient to leave the coke from the previous charge in the manufacture of ordinary gas in the retort. The carbon which is deposited when purified coal gas is thus decomposed ranges in character in the direction of the current of gas through the retort from the finest flaky soot to the most beautiful silver-grey crystalline needles. The increase in volume which, according to theory, would be expected on the decomposition of purified coal gas is not actually quite attained, owing to the difficulty of maintaining the retorts quite gas-tight. An increase of 20 per cent. in volume is about realized.

The fitting up of retort-settings for producing balloon gas is a simple and not costly matter. A 1½-inch pipe is laid from the gasholders to the bottom of vertical or the back of horizontal retorts, and a similar pipe from the ordinary ascension pipes to the gasholder reserved for the balloon gas. A small purifying plant, consisting of a simple atmospheric condenser, a dust filter, and an oxide purifier, is interposed in the exit pipe for the gas, in order to cool it and remove fine particles of carbon and small quantities of sulphuretted hydrogen which are formed from the traces of carbon bisulphide in the purified coal gas. The purifier requires to have an area of 0·09 square foot per 1000 cubic feet of gas made per diem. The material used for filtering the fine carbon dust from the gas is fine wood shavings. As the carbonic acid in the gas is decomposed on its passage through the incandescent coke, apparatus for abstracting traces of carbonic acid from the balloon gas can generally be dispensed with. The gas is sucked from the purifying plant and pumped into the special gasholder by an exhauster. A single vertical retort produces 706 cubic feet of the gas per hour; but as six hours out of twenty-four are required for recharging and heating-up the fresh charge of coke, only eighteen hours are practically available for the manufacture of the gas. Hence the productive capacity of one vertical retort is 12,714 cubic feet per twenty-four hours. Thus the productive capacity of a setting of ten vertical retorts is about three times as much as that of a special hydrogen plant.

With settings of horizontal retorts, only those retorts which can be raised to a temperature of about 1200° C. (2192° Fahr.) can be employed; and this is generally the case with only the upper four to six retorts of a setting of eight. The rest of the retorts are charged with coal at the same time, and produce ordinary coal gas. A 10-foot retort raised to the proper temperature produces 350 cubic feet of gas per hour, and it is available for gas making for twenty hours out of the twenty four. Consequently, it yields about 7000 cubic feet per twenty-four hours. If four retorts are used, the productive capacity of the setting is 28,250 cubic feet, or if six retorts are employed, 42,380 cubic feet, per twenty-four hours. The latter is the greatest productive capacity of the special hydrogen plant ordinarily used for charging balloons.

The additional cost of preparing the special balloon gas from ordinary coal gas is computed as follows, per 1000 cubic feet of balloon gas made: Fuel for heating four to six retorts, 5·3d.; wages, 1·5d.; maintenance and repairs of setting, 0·9d.; general working expenses, 1·3d.—making a total of 9d. The cost of adapting a horizontal or vertical setting for the manufacture of balloon gas, including condensing and purifying plant, and an exhauster, is about £150 to £200; and the interest and depreciation charges on this expenditure may be reckoned at about 10d. per 1000 cubic feet of balloon gas made. In order to arrive at the total cost of the balloon gas, the holder cost of the coal gas must be added. This is usually about half the cost of coal gas into the consumers' meters. The distributing charges on coal gas therefore about balance the extra cost of producing balloon gas. Hence the total cost of the balloon gas should not be higher than that of ordinary gas as sold for industrial purposes.

The specific gravity of coal gas in Germany varies between 0·36 and 0·53, and the specific gravity of the balloon gas varies more or less according to that of the coal gas from which it is produced. At Dessau, the fluctuations in the specific gravity of the balloon gas have ranged from 0·225 to 0·3; and an average specific gravity of 0·27 may be assumed, which corresponds with a lifting power of 59¼ lbs. per 1000 cubic feet. It is noteworthy that coal gas, which is regarded as bad or poor for use in airships, is better for ordinary heating purposes than the light coal gas which would be specially suitable for balloons. Hence if a gas manager prepared for general supply a specially light gas on any occasion on which balloons were to be charged, he would be producing a gas which, from the point of view of his ordinary consumers, would be inferior. It is therefore impracticable to change the procedure of gas manufacture for the sake of filling one or two balloons.

Description of Gas.	Specific Gravity Air = 1.	Volumes per Cent.	
		Dessau Coal Gas.	Dessau Balloon Gas.
Heavy hydrocarbon	0·97—2·7	2·6	—
Carbonic acid	1·52	1·3	—
Oxygen	1·105	0·2	—
Nitrogen	0·97	6·3	5·1
Carbonic oxide	0·967	5·3	7·3
Methane	0·553	24·7	6·9
Hydrogen	0·069	59·6	80·7
Specific Gravity		0·41	0·225—0·3
Lifting power per 1000 cubic feet . pounds		47·6	62·4—56·2

The difference in composition of the ordinary Dessau coal gas and of the balloon gas made from it is shown in the annexed table, in which the average lifting power of the two gases is also stated. The freedom of the special gas from benzol and other heavy hydrocarbons and impurities capable of acting on the envelope of the balloon is a great advantage. The new gas has a feebler smell than ordinary coal gas, and is less sensitive to variations of temperature. On storage for fourteen days in a gasholder at Dessau, no change in specific gravity could be detected. This is a great advantage, both from the point of view of the gas-works and the aeronauts, since it indicates that the gas may be prepared and stored for a long time in advance. A balloon of 44,500 cubic feet capacity was filled at Dessau in 45 minutes.

It is worth while recalling that in the year 1869 a druggist—M. E. Vial, of Paris—published an article suggesting the production by the decomposition of coal gas of hydrogen for heating and power purposes and for lighting by raising platinum to incandescence. C. Schinz, in a subsequent article, pointed out that though the volume of hydrogen obtained might be about double that of the coal gas decomposed, the fuel consumption would also be about doubled; and hence the process would scarcely be economical. In regard to these early suggestions, the author points out that the production of hydrogen in this manner on a large scale would be considerably affected by the unsoundness of the retorts. It is worth recalling the suggestion, however, in view of the fact that a procedure which would be economically impracticable for a gas for lighting and for heating purposes becomes practicable for a gas for filling balloons, because the high distributing charges are saved with the latter.

The paper concludes with appendices, giving the details of the equipment of the retorts and the procedure to be followed in the manufacture of a special balloon gas from coal gas.

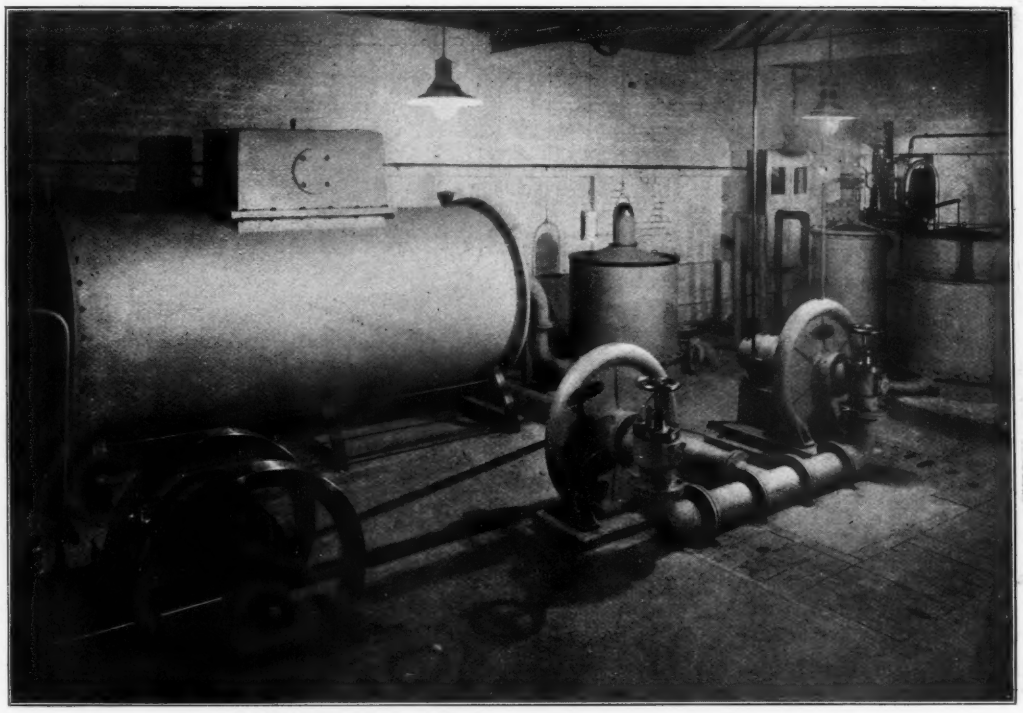
The foregoing particulars in regard to the method adopted by the German Continental Gas Company for the production of a balloon gas from coal gas are of special significance at the present time, having regard to the publication in a recent "Journal" (p. 269), of an abstract of the specification of a patent dated June 28, 1909, granted to Dr. R. Lessing for a special process following the same general lines for producing such gas.

HIGH-PRESSURE GAS FOR RAILWAY PURPOSES.

Lighting of the Brighton Railway Station, Workshops, Goods Yards, and Sidings.

STARTING after dusk from the Victoria Station of the London, Brighton, and South Coast Railway for the Queen of southern seaside resorts, one begins the journey from the magnificent and extensive station, under the light of high-pressure gas-lamps (which illuminate the whole place in a manner that has caused no little admiration on the part of the public, and has produced a by no means small economy for the Railway Company), and ends the journey at Brighton to find the extensive terminus there also lighted by high-pressure gas, in a fashion that induces the expert in artificial lighting to express his opinion that it is well and not over done. The light is so excellently diffused all over the place that, from whatever point one takes up for making survey, uniform illumination is found; shadows are suppressed by judicious placing of the lamps; platforms, lines, and standing trains are covered by the effulgence; reading can be enjoyed in every part; there is no glare, on the contrary the light is soft; there is no flickering, the light being as steady as a light should be. Moreover, it is not prone to failure. Such are the impressions of the illumination of the Brighton Railway Station, and it is the sort of lighting that, for public convenience and railway working economy, should be the vogue at every station of importance, and for that matter would be preferable at every station, though of minor degree. The system used at Brighton is the Keith, with the new inverted types of lamps. But the lamps and the effects that one sees on the main station and platforms constitute part only of the high-pressure gas lighting, which extends to goods yards, sidings, through some 60 acres of locomotive and other workshops, with lamps running almost up to Preston Park. This is an extensive piece of lighting; and it is made of greater technical interest by the facts that the installation is complete in itself from the compressing-house throughout, that the ignition and extinction of the lamps is by electrical means, and that it incorporates several features showing that every precaution has been taken in connection with it to ensure against interruption of the lighting.

Before we go farther, let us congratulate the Railway Company on the practical demonstration they have made of the economy and efficiency of high-pressure gas lighting; and the Brighton and Hove Gas Company (and particularly their Chief Engineer, Mr. Joseph Cash) and the Contractors (Messrs. James Keith and Blackman Company, Limited), on the good account they have, through the installation, silently but brilliantly given of themselves and of the high-pressure system of the latter, and on the excellent service again rendered to the gas industry in proving that,



The Gas and Air Mixing and Compressing Plant at the Brighton Railway Station.

in a fair field, gas is capable of rendering more effective and more economical service than its strongest and keenest rival—electricity, and at its very best.

The station and its precincts were formerly electrically lighted. This fact and the change speak louder than words. The electric light has been evicted on the ground of economy alone, but not until there had been competition. The eviction and the new installation have proved, by the contrast of past and present, the superiority in the matter of efficiency of the scheme upon which the choice of the Railway Company eventually fell. The change in lighting forms part of a big scheme of workshop reconstruction and reorganization which has been proceeding for some time. The Railway Company themselves prepared a plan for electric lighting. The Brighton and Hove Gas Company, not to be behind, submitted two schemes for gas lighting—one of which comprehended the complete Keith system from the mixing and compressing plant to some 2000 lamps, including electrical ignition and extinction devices; thus giving addition to economy and superior efficiency, and incorporating the boasted convenience of electric lighting of immediate ignition and extinction.

There was, last Thursday evening, an inspection of the new lighting and lamps and plant under all the circumstances of lamp use in the station proper, goods yards, over sidings, and in workshops, at which inspection were present the Chief Engineer of the Railway Company (Mr. C. L. Morgan), Mr. Joseph Cash, Mr. J. Petrie (Engineer of the Southern Division of the railway), Mr. A. Stanley Cooke (the Gas Company's Chief Inspector), Mr. A. Collinson (Manager of the James Keith and Blackman Company), and local and other gentlemen. But before giving a sketch of the visit and what was seen, there are a few points of general and technical interest that should be presented to put readers at once into possession of the extent of the installation and of the special features of the plant.

EXTENT OF THE INSTALLATION.

There is no precise knowledge as to what will be the ultimate extent of this installation, as the new lights are so much appreciated that the borders of the scheme are being frequently pushed out by a request for one of the new lamps here and a new lamp there; and these are not denied if utility and convenience are served. But at the present time there are fixed about 2000 lamps in all; the greater portion being of 100 and 60 candle power. The smallest units are used chiefly in the workshops for bench lighting; one lamp being allowed for each vice. The vices are, on the average, 7 feet centres; and with the 60-candle unit of lighting, the consumption being only 1¼ cubic feet per hour, the effect is perfect. Other lamps of 100, 150, 300, 360, 500, and 1000 candle power, are used for general lighting; the area to be lighted, and the height at which they are fixed, determining the candle power. The station lights throughout are of 500-candle power, and situated at about 40 feet centres, 12 ft. 6 in. from the platform level. In addition to the forecourt and circulating space, there are seven rows of lamps; making in all 75 500-candle power, or a total of 37,500-candle power. This is secured at the modest cost of 1s. 3d. per hour. The lamps on the sidings and in the goods yards are 1000-candle power, fixed on steel columns; the light being 25 feet from rail-level. The old electric light standards, it is understood, have been utilized; and we are inclined to think

HIGH-PRESSURE GAS LIGHTING BY INVERTED LAMPS

At the Brighton Station of the L.B. & S.C.R.

IN THE DAYS OF ELECTRIC LIGHTING

At the Brighton Station of the L.B. & S.C.R.

the height is unnecessarily great for such a candle power. But in the goods yards, where the lamps are a reasonable distance apart, the effect is all that could be desired.

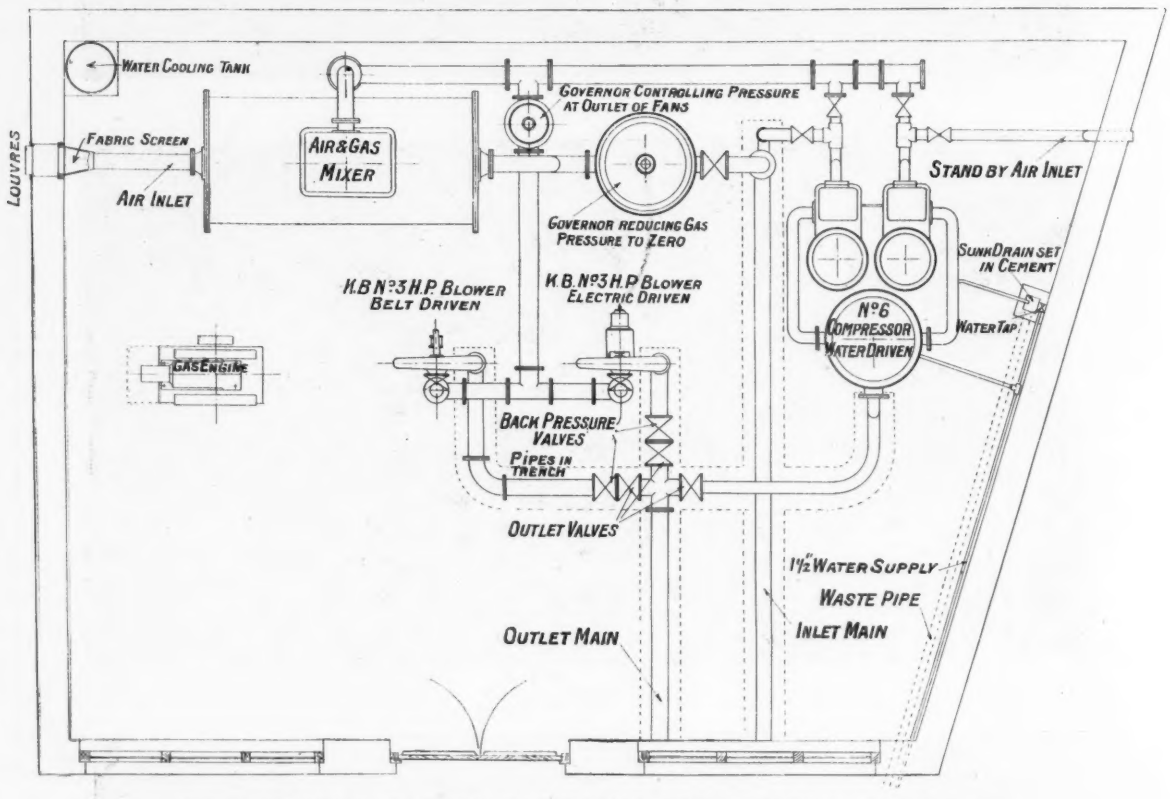
The Keith Mixing and Compressing Plant.

Novel ideas have been introduced into the mixing and compressing plant used in this installation to meet special requirements. In the first place, the lamps have been modified to work with a mixture of gas and air at 10 inches pressure, instead of the usual 54 inches pressure; the chief object of the modification being to enable the pressure to be kept on night and day automatically, by means of the Keith automatic water-driven compressor. While the capacity of this is quite sufficient for all likely requirements after midnight and during the day, the main compressing is performed by means of two high-pressure fans of the Keith-Blackman narrow pattern—one driven by a gas-engine (used normally), and one by an electric motor, which is used as a stand-by, and is also arranged to come in automatically in case of the failure of either the water supply for driving the automatic compressor, or collapse of the gas-engine.

In this installation, the mixture used is composed of equal parts of gas and air; and the apparatus for producing it consists of a large double wet meter, having two drums keyed to one spindle—one drum being connected to the gas supply, and the other drum being connected to an air-inlet pipe. The drums both discharge into a common chamber; the outlet from which is coupled up to the three compressors. The air (drawn from the outside of the compressor house) is filtered before passing into the mixer by flowing through a fabric screen. The gas pressure is reduced to zero by a Keith governor. This arrangement allows an absolutely invariable proportion of gas to air, irrespective of the rate of consumption. The pressure given by the automatic water-driven compressor is regulated by the weight of the compressor holder, in the standard method, which is doubtless familiar to most readers.

The pressure given by the fans is arranged to be slightly higher than that thrown by the water-driven compressor; so that, when either of them comes into action, the holder of the water-driven compressor is raised, and this machine is put out of action. The pressure produced by the fans is regulated automatically by a governor fixed on the common inlet to the fans. This governor consists of a holder bell arranged to float at the required pressure, which bell is connected by means of a chain to a throttle valve, operated by a quadrant. When the governor holder rises, the throttle valve is arranged to close; and, by doing so, it at once reduces the pressure on the inlets of the fans. This, of course, has a corresponding effect in reducing the outlet pressure. If the pressure tends to fall, the opposite result takes place. The controlling pressure is brought to the governor holder by a 1-inch pipe connected with the delivery-pipe from the fans.

The automatic device for throwing in the electrically driven fan in case of emergency, is extremely simple. It will be readily



Arrangement of Compressing Plant for the Keith Light Installation at the Brighton Railway Station.

understood that, in the event of the water-pressure failing, or the gas-engine driven fan failing to keep up the pressure, the regulating holder of the water-driven compressor would begin to fall. When this passes a pre-determined point, a small switch is thrown in. This switch controls an automatic electric starting switch, which gradually turns on the current to the electrically driven fan. The same action will take place should the water-driven compressor be overtaxed at any time, by sudden demand, before there is time to start up the gas-engine driven fan.

The capacity of the water-driven compressor is approximately 6000 cubic feet per hour; and that of each of the fans is 25,000 cubic feet per hour. The present demand upon the plant being about 12,000 cubic feet, the fans would be able to comfortably deal with twice this volume of mixture; so that there is a large margin of safety, and for future possible extensions. It will be understood, of course, that the power taken by this type of fan is somewhat proportional to the output; about 1½-horse power being required to deal with the maximum demand. The small power taken by this class of apparatus was a further inducement to employ the mixture method in such a large plant; for had the same quantity of gas been required to be compressed to 54 inches by positive rotary blowers, at least twice the power would have been necessary.

Electrically Igniting and Extinguishing the Lamps.

There is one other feature of particular technical interest, and that is the method of lighting and extinguishing the lamps readily and with the certainty of electricity, and with the added certainty that when once lighted they will remain so. This is carried out by a new system of control and ignition introduced by the James Keith and Blackman Company, and specially adapted for use with high-pressure gas lighting. There have been in the past, many attempts made, with more or less success, to control and ignite gas-lamps by electric means; but none of the systems could be satisfactorily applied for use with high-pressure gas. Two reasons accounted for this. There was the difficulty in operating a valve, which would be tight at high pressure; and the further difficulty of the igniter being apt to be destroyed by the great heat, when placed close enough to the burner to effectually ignite it. Both of these difficulties have been successfully overcome in this new system.

The valve consists of a drop valve with the pressure on the top, so that the pressure tends to keep the valve closed. Attached to the stem of the valve is an iron rod, which forms the core of an electro-magnet, and works in the gas-way. A short distance above the top of the rod is fixed a permanent magnet. The valve operates in this way: When the current is passed through the coil in a direction which magnetizes the core, so that the adjacent ends of the permanent magnet and electro-magnet are of opposite polarity, the combined effect of the two magnets is sufficient to lift the core and the valve up to the permanent magnet. When the operating current is stopped, the core is held up by the permanent magnet. In order to close the valve, the direction of the current through the coil is reversed; so that the adjacent ends

of the electro-magnet core and the permanent magnet become of the same polarity, and thus repel each other, and allow the valve to drop on to its seat. A simple mechanical arrangement is provided for opening and shutting this valve independently of the electric action, should it be required.

The arrangement for lighting the lamp is also on novel lines. A small chamber is attached to the heater in the lamp; and this chamber is adapted to be supplied with a very small portion of the mixture which is passing to the burner nozzle, when the lamp is turned on. Into one end of this chamber is fixed the igniter, which consists of a platinum filament mounted in a porcelain plug, one terminal of which is connected to the coil, and the other to the gas-pipe; the filament forming part of the electric circuit in which the coil is fixed. On the current being allowed to flow through the coil and filament, the valve is opened, and a portion of the explosive mixture in the heater of the burner finds its way into the small chamber, which, coming in contact with the filament, causes a small explosion, the resultant flame from which is blown out through an opening in the chamber, and is directed towards the lower portion of the mantle. This flame ignites the mixture, which is at the same time passing into the mantle. It will be seen that this method gives a certain ignition without requiring to bring the filament close to the mantle.

Each burner is controlled by its own switch, which is fitted with a white and black button. On pushing the white button, the lamp is turned on and the lamp lit; and on pushing the black button, the lamp is extinguished. At a height commanding the whole station, a switch-board is fixed; and from there the whole of the lighting can be viewed and controlled.

The current for operating the lamps is supplied by sets of accumulators situated in various centres about the installation. Each set of accumulators is in duplicate, and is charged from the electric power main used for operating the machinery in various parts of the works. The arrangement ensures that there is always one set of batteries completely charged in case of failure of the other set.

Incidentally it was heard from Mr. Collinson that, in the installation of this system of iguition and extinction, no less than 60 miles of wire were used; and, speaking of miles, reminds us that a distinct system of Mannesmann steel mains (with services) have been laid—comprising in all about 2½ miles—in connection with this installation. These were specially laid by the Gas Company, under the superintendence of Mr. Cooke. Owing to ashes forming such a large part of the subsoil, it was considered necessary to protect the steel tubes by laying them in troughs and covered with pitch.

The Inspection.

Before starting on the inspection on Thursday evening, the little company dined together; and there was a limited amount of informal speech-making afterwards. Mr. Joseph Cash performed the part of host on behalf of his Company. In a few remarks, he touched upon the object of the visit, and spoke of his gratification at the successful issue of this large installation of high-pressure lighting. It must indeed be gratifying to him, seeing the vast amount of responsibility that attaches to its successful running. But the confidence of the technical chiefs of the Gas Company, of the Railway Company, and of the contractors was complete before the work was entered upon; and the confidence of the tripartite interests has been confirmed to the full. Mr. Cash acknowledged his indebtedness to the contractors, to the engineering staff of the Railway Company, and to his own staff, in bringing the work to a happy issue. Then there was a speech from Mr. Collinson, in the course of which he intimated that this is one of the largest contracts for private high-pressure lighting there has been in his experience. To the contractors, it had been a pleasure to see the scheme through; and the conditions under which they have had to work were made most pleasant by the assistance rendered by both the Railway and the Gas Companies' staff. With an expression of the view that high-pressure lighting is going to have a big effect on the future of the gas industry, he spoke of what had been done by its aid to secure London lighting contracts. The sustained efficiency of the lamps as demonstrated at Aldwych was also mentioned. As he pointed out, too, the Gaslight and Coke Company would not go to the capital expenditure that they are incurring, nor would the Brighton Railway Company have gone to the expense that they have done, had they not been abundantly satisfied that what the contractors for the Keith system claim is demonstrably true. "The light is second to none," he said, "in penetrating power, in brilliance, in its softness upon the eye, and in cheapness." That is an all-round good character. Then he proceeded to describe (in language as devoid of technicalities as possible) the ingenious system his firm have devised for the electric ignition and extinction of the high-pressure lamps, as practised in this installation, and as already described

After hearing more about the lights, we went to see the actual thing. Starting at the lower railway goods yard, quite luxuriant lighting was found; the men carrying on their work under artificial light that was almost as good for their purpose as daylight. This is where the 1000-candle power lights are fixed; and as the visitors, mostly strangers, wandered along—all pronounced in their encomiums as to the lighting—there was no falling over lines, points, or shunting rods or levers, and no robbing the truck-wheels of their lubrication. The pitfalls were many; but thanks to the adequate lighting, we all proceeded safely and without damage with the inspection. There are all-told something like sixty 1000-candle power lamps in the goods yard and along the sidings towards Preston Park; and each one is under separate control by means of push buttons within reach of the hand on the columns. Mr. Morgan, the Railway Company's Chief Engineer, mentioned that the difference between the lighting when electric lamps were used and now was something remarkable; and whereas formerly the men were constantly complaining of the poor lighting, now they work under comfortable conditions in this respect. It is indeed a triumph of lighting under difficult conditions.

Some little distance from all this activity is the power house. To this we were taken, and there is in it a feast for the mechanical engineer who can admire both ingenuity and good work and give due credit for it. The plant has been described; and Mr. Collinson demonstrated how there is an automatic "ringing of the changes" on it in the event of emergency, or when greater power is required, and generally for protection. We fail to see how any accident could possibly occur that would interrupt the supply of high-pressure gas. The actions and devices that produce this automatic control and assurance are all very simple, but efficient and positive.

Back again to the sidings, and then some of the workshops were visited; the aggregate area of these shops being, as previously stated, about 60 acres. We went into the wheel-shop, and saw the big wheels of locomotives stacked up in long rows as though they were matters of small moment. They partly constitute the affairs of everyday life here. This huge shop, we were informed, is lighted for 1d. an hour by fourteen lamps of 150-candle power and three of 360-candle power. Then the visitors were taken to see the bench lighting in one of the shops, where men were on vice work. This was the one-lamp-per-man lighting; each light being of 60 candle power, and consuming 1½ cubic feet of gas an hour. There are about eighty hours' lighting per man to be obtained by these means for 2½d. The men testified to the great improvement of the illumination; and one thing they specially like about it is the steadiness of the light. In the frame-fitting shop, the place was lighted almost as brightly as one would expect to find it in the daytime. Here one could see to work at any machine; and it was extraordinary how clearly could be seen the delicate markings on the work in progress. Passing through to the boiler-shop, several mammoth boiler shells upon which work is proceeding were examined. All the machinery here is driven by electric motors, as well as the powerful traversers which run lengthwise and transversely of the house. If the lighting has gone over to gas, the Corporation of Brighton cannot complain of a customer who takes—what shall we say?—one-tenth of the total ouput of their electricity generating-station for power purposes. There are 45 lamps in this shop—mostly 500-candle power, with two of 2000-candle power; and the cost of lighting the place is only 9d. an hour. Some of the lights are fixed rather high, on account of the traversers. If it were not for these, they could with advantage have been dropped 10 feet. Apart from the lighting, the visit to these shops was an intellectual treat, although only some of them were inspected.

Time, however, was passing; and there could only be a hurried inspection of the station before visitors from London had to leave. Then were gained the impressions to which expression is given in the opening paragraph of this article. In few words again, the lighting is rational and magnificent; and everything is under perfect control.

The plant has now been running some few months; and the Railway Company have expressed their approval in about the most practical manner possible, by placing with the contrators an order for two additional plants; one being for their new works at Lancing, with compressing plant practically of the same capacity as that at Brighton. Once, again, we take the opportunity of heartily congratulating all concerned in this notable piece of high-pressure incandescent gas lighting. What has been done here in producing economy and efficiency, and excellent working conditions, can be done equally well elsewhere.

We have received from Mr. George Helps, of Nuneaton, a copy of the first number of a new fortnightly publication entitled "Gas." It consists of eight quarto pages; and its contents will be devoted mainly to the subjects of "Light," "Distribution," and "Maintenance," which words form a kind of sub-title. The object of the publication, as set forth in the "Editorial" Notes, is "to deal particularly with all matters that concern the requirements of the consumer of gas for public as well as private lighting;" and the endeavour of its conductors will, it is stated, be "to promote the welfare of the consumer jointly with that of the supplier of gas."

The Board of Agriculture and Fisheries have published a memoir of the Geological Survey on the "Water Supply of Oxfordshire," and a copy has been sent to us. It is the ninth of a county series dealing with the water supply derived from underground sources. The introduction contains particulars of the geological formations of the county, with special reference to the water-bearing strata. Accounts are given of wells, borings, and springs, with supplies therefrom, and analyses. The memoir is accompanied by a rainfall map of the county, with explanatory report and statistics; and a bibliography of published works relating to the water supply of the county is included.

ANOTHER HIGH-POWER INVERTED LAMP.

Milne's (1910) "Viaduct" Lamp.

CHEAPNESS, strength, accessibility of parts, and efficiency are the four characteristics that are looked for nowadays in high-power lamps for low-pressure service; for, as a rule, such lamps are fixed in positions that especially demand from them the four qualities named. Due recognition of the essentials to a successful lamp has been made by Messrs. James Milne and Son, Limited, in the new type, for outdoor and indoor purposes, that they have introduced under the title of Milne's, 1910, "Viaduct" lamp. The question of cheapness can be passed by, with the intimation that, we are convinced, every customer will be satisfied on that score. As to strength, we have heard complaints from several users as to certain types of high-power lamps having a comparatively short life. In this lamp, Messrs. Milne have adopted a stronger case than they have done before, so as to make the exterior less susceptible to the ravages of the extreme climatic conditions to which, at any rate, the exterior forms of lamps are exposed in this country. The casings are made with welded joints, and of double-enamelled steel—the outdoor patterns, by the way, being finished in green and gold, and the indoor ones in white and gold.

But a most important feature of the lamp is the accessibility of all the parts vital to the maintenance of efficiency. This is accomplished by making the lower part of the cylindrical body just like a shutter, which simply slides up into the head of the lamp, and is self-supporting. In the outdoor form of lamp, the means for gas and air regulation are immediately at hand, and when the shutter is closed they are completely protected. As to the lower part of the lamp, the glass bowl is supported by the hinged shade, which, when closed, is held rigidly in position by a weighted catch.

The interior construction of the lamp makes it self-intensifying. The lamps are constructed with two, three, or four burners; and each burner has on opposite sides two flues, which conduct the products of combustion away to the head of the lamp for dispersion, thus keeping pure the air supply which finds entrance into the cylindrical body. At the same time, the double flues to each burner represent a large heating surface, which keeps the chamber formed by the cylindrical body well heated. Consequently, no cold air is supplied for admixture with the gas or for supporting combustion. The central gas-supply tube also passes through this heated chamber; so that gas, as well as air, becomes heated before reaching the point at which they intermingle. The gas supply is regulated by a screw, with lock-nut, at the top of the burner, and the air supply by a sliding collar—the air-holes themselves being covered by gauze to keep out any extraneous matter. The simplicity of the burner is an advantage in its maintenance. By the removal of the gas-regulating screw, a rod or small brush can be passed right up through the bunsen tube, and out at the top of the burner. The nozzles are made so as to take mantles of universal size; and the fittings for the inside glass chimneys and the globes are such that ordinary stock patterns can be used. This is an advantage, as lamps requiring special mantles and glassware do not tend to economy in maintenance.

The efficiency of each burner is placed at about 120 candles with a consumption of 4 cubic feet of gas. Among miscellaneous points, it may be of interest to mention that the overall length of the two-light lamp is 25 inches, of the three-light one 28 inches, and of the four-light one 33 inches. Each burner is fitted with a flashing-jet supplied from a common bye-pass tube. The lamps are ordinarily made with a lever-cock and chains; but any other form of tap can be supplied. Already, several gas authorities have taken up the lamp; and many others will no doubt do so when they have had an opportunity of testing it, or making inspection of it at one of the Company's show-rooms.

We learn that the Jurors at the Brussels Exhibition have decided to award a Grand Prize for the Humphrey pump in two classes—as a gas-engine and as a pump. It was described and illustrated in the "JOURNAL" for the 26th of October last, and it is on view in the Machinery Section of the Exhibition, which, fortunately, was not damaged by the recent disastrous fire.

MODERN PYROMETERS.

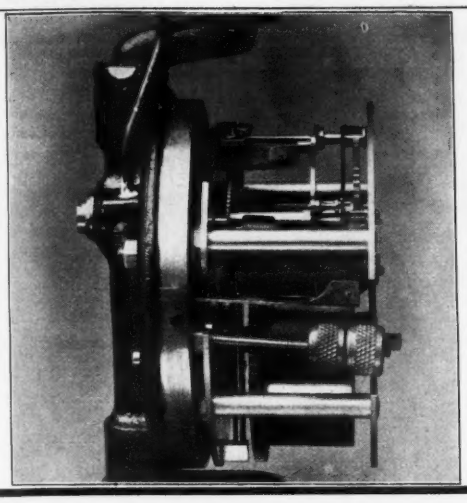
WE have received from Mr. Robert S. Whipple, of the Cambridge Scientific Instrument Company, Limited, a copy of a paper on recent advances in pyrometry, which he read a short time ago before the Birmingham Metallurgical Society. It constitutes a useful summary of work lately done in this direction; and a few particulars of the ground covered by it may be given.

The author refers first to the gas thermometer which is the final reference in all thermometry. The temperature measurements with gas thermometers have now been extended to 1550° C. (2822° Fahr.) and 1600° C. (2912° Fahr.) by Day and Holborn respectively, by the use of, in the one case, a platinum rhodium bulb surrounded by nitrogen at the same pressure as that inside the bulb, and, in the other case, of a bulb of pure iridium. The probable error in measurements between 300° and 1150° C. (572° and 2102° Fahr.) is believed by Day to be not greater than 0·5° and by Holborn between 2° and 3°. The next section of the author's paper is on resistance thermometry, in which he does not find any striking advance to report. For temperatures up to about 1000° C. (1832° Fahr.) a useful improvement has been introduced in constructing a thermometer in quartz. The resistance wire is wound on a rod of quartz, and protected by a very thin tube of quartz fused over it, by which arrangement the wire is protected from the injurious effects of gases and mechanical strain. The third section of the paper refers to thermo-electric pyrometry. For standard thermo-couples, platinum and certain platinum alloys have been produced in a purer and more homogeneous state than hitherto, so that it is now possible to obtain a second thermo-couple similar to one previously obtained, which may be used without introducing any serious error on the same galvanometer or recorder. Owing to the rapid destruction of platinum and platinum alloy thermo-couples in certain not well-defined conditions, many attempts have been made to produce cheaper thermo-elements, of which the most satisfactory for temperatures not exceeding 700° C. (1292° Fahr.) is copper-constantan. Constantan consists of 60 per cent. of copper and 40 per cent. of nickel. According to Pécheux, a copper-nickel couple may be employed satisfactorily for temperatures up to 900° C. (1652° Fahr.). The author's experience is that, for accurate results, it is necessary to calibrate every individual couple, and that if the couple is overheated or perhaps over-annealed the calibration may become seriously altered. Various potentiometers have been designed in recent years specially for accurate work with thermo-electric couples; and recorders of various types have also been introduced.

The next section of the paper refers to radiation pyrometry, in which great progress has taken place in recent years. Depending on the fact that as the temperature of a hot body is changed the wave length of the radiation having the maximum energy will be changed so that the product of the wave length and the corresponding absolute temperature is a constant, a great many instruments have been designed for measuring radiation. The first satisfactory radiation pyrometers were photometric. The monochromatic light is matched against that obtained from a lamp, which in the Féry photometric pyrometer is the Hefner amyl-acetate lamp, and in the case of the Wanner pyrometer is an electric incandescent lamp. The author states that the Wanner pyrometer is not applicable to temperature measurements below 900° C (1652° Fahr.) owing to a considerable amount of light being lost in its optical system. The range of the Féry pyrometer has recently been largely extended by the addition of extra neutral tinted glasses. The Féry and Thwing pyrometers use the total radiation from a hot body. The first forms of these pyrometers required the use of a galvanometer; and for works where it is desirable to dispense with the latter, Féry has introduced another form, in which the radiation is concentrated on a small bi-metallic spiral carrying an aluminium pointer. As the temperature of the spiral increases, it unwraps, and so moves the pointer over the scale. Optical pyrometers are calibrated in terms of the radiation emitted by a black body; and the temperature measured by them will depend on the nature of the black body under observation. The difference between the black body temperature and the real temperature has only been determined for platinum and a few other bodies; and the author points out that it is much to be regretted that no authoritative work has yet been carried out on the black body temperatures of molten iron and steel, since these values would be extremely useful industrially.

The last section of the paper refers to the standardization of pyrometers. The tendency of recent workers has been to adopt the melting-points of pure metals as standards of reference, as several of these melting-points are known to a high degree of accuracy. There is, however, difficulty in obtaining the metals sufficiently pure to ensure an accuracy of 1° C. at the higher temperatures. But the "commercially pure" metals will afford an accuracy of 1° to 3° C., which is amply adequate for most technical purposes. A table of the solidifying points of a number of metals from recent determinations concludes the author's paper, which will be found very useful to those who have occasion to make accurate pyrometrical measurements.

The vacancy in the secretaryship of the Northampton Gas Company caused by the death of Dr. Faulkner, has been filled by the appointment of Mr. C. H. Batten.



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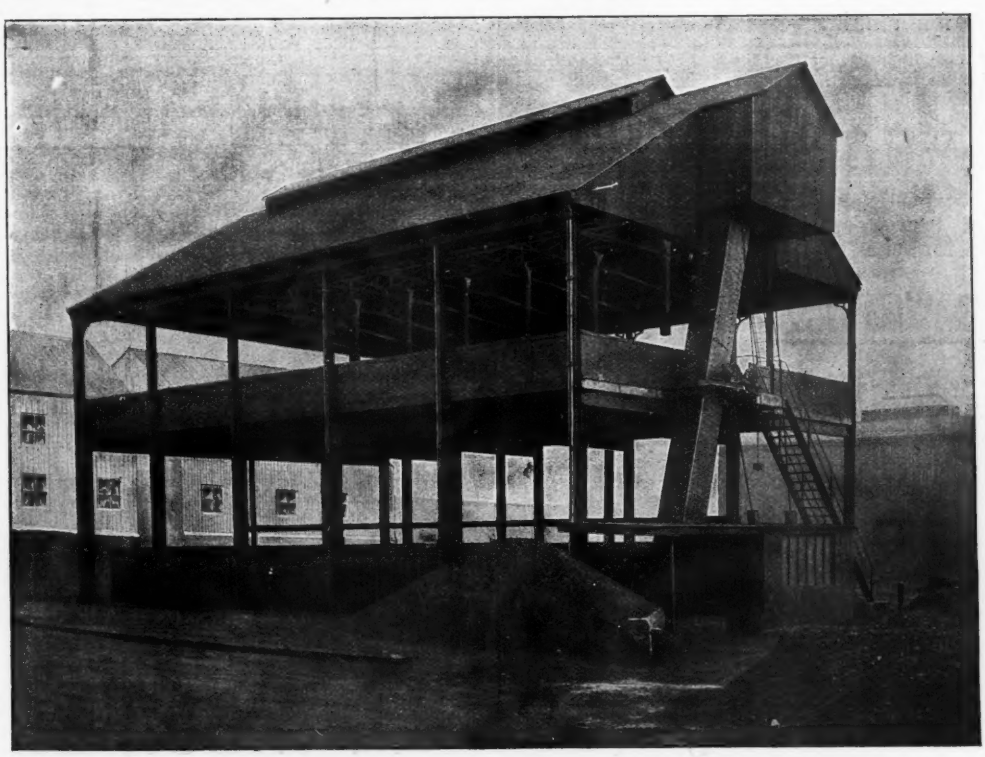

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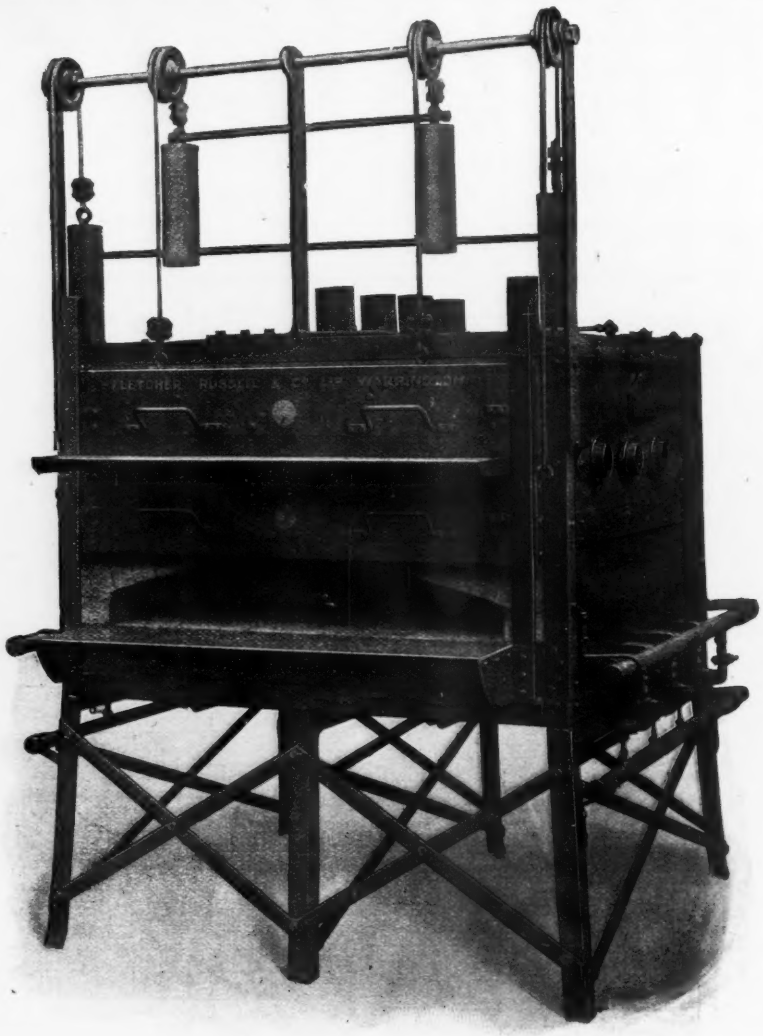

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THE STORAGE OF GAS AND THE HAMBURG GASHOLDER CATASTROPHE.

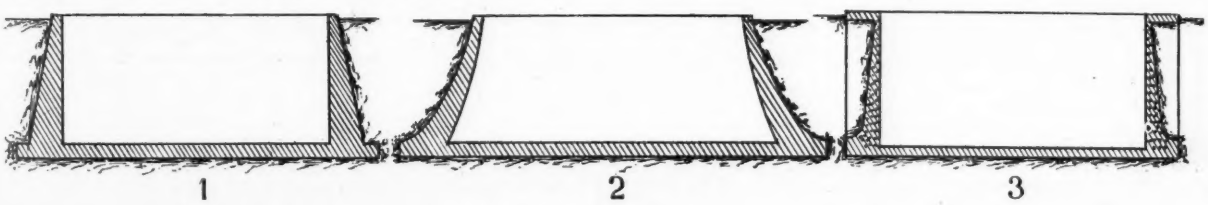
THE disaster at the Grasbrook Gas-Works of the Hamburg Corporation on the 7th of December last—by which twenty lives were lost and about seventy workmen and others were injured, is recalled by papers which have been read before meetings of the Aix-la-Chapelle district branch of the German Association of Engineers.

One read at the meeting of the branch on Feb. 2 last, by Herr Scholz, the Manager of the Hamburg Fire Brigade, added little to the information which had already been published in the "JOURNAL." The author refused to express an opinion as to the cause of the catastrophe, since a committee of experts had been entrusted with the investigation of the roof-construction, and had not so far issued their report. This Committee consisted of Herr Müller, of Breslau, Herr Boost, of Berlin, and Mr. E. Körting, the Manager of the Berlin Works of the Imperial Continental Gas Association. In regard to the prevention of similar accidents, the author, however, stated that the peculiar conditions of the Hamburg site must be taken into consideration; and that such a catastrophe need not be feared with gasholders in general. The Hamburg authorities, indeed, contemplated re-constructing the two gasholders on the same lines; but it had not been made known to what extent the details would be modified. Special precautions, however, were desirable, in view of the peculiar constructional conditions; and he suggested that there should be provided automatic indicators of accumulations of gas in the chamber of the tank, and that no gas services at all should be allowed in the substructure.

The second paper, which was read on the 9th ult., was by Herr Scheuss, the Engineer of the firm of F. A. Neuman, of Eschweiler. This firm was, jointly with the Berlin-Anhalt Engineering Company ("Bamag"), responsible for the structural work of the gasholder of 200,000 cubic metres (about 7,060,000 cubic feet) capacity at Hamburg. It was in this holder that the disaster on Dec. 7 last originated, though a second smaller gasholder—of older and different construction standing alongside it—became involved and was burnt out. Herr Scheuss' paper, which has been printed in the August part of the "Mitteilungen des Aachener Bezirksvereins Deutscher Ingenieure," is entitled "Gas Storage," and deals first with gasholder construction in general, and lastly with the large Hamburg holder. The following is an *epitome* of its contents.

The increased application of gas necessitates more storage capacity on gas-works. Gas from recovery coke-ovens is about to be used for the public supply of the towns of Barmen, Mülheim, and Bochum. The gas evolved from coke-ovens from the second to the tenth hours of carbonization is of uniform calorific power; and if it were collected from all the coke-ovens in the Rhenish-Westphalian district and half of the total were employed on the works, there would be a surplus of 180 million cubic feet of gas available per diem for the supply of towns. This surplus would in three months amount to the present supply of gas for a whole year to all the towns in the Rhine district. Storage accommodation for coke-oven gas would be required to an increasing extent, and perhaps also for blast-furnace gas. Attempts have been made from the earliest days of gas supply to dispense with the liquid seal in gasholders; and there has lately been a revival in the evolution of schemes for the construction of tankless gasholders. Most of these have involved the employment of some elastic medium. The author, however, in the year 1907 elaborated a method of storing gas under pressure in a closed vessel. The sphere was the form which was most economical of material for the storage vessel; and for the storage at a maximum pressure of two atmospheres of 3½ million cubic feet of available gas, the author computes that there would be a saving in weight of steel, as compared with an ordinary gasholder of that capacity, of 400 tons—value (say) £6000. There would be a further saving of about £2000 in respect of foundations, tank, painting, &c. Against this, however, must be set the cost of compressing plant for 3½ million cubic feet of gas to two atmospheres in 24 hours, which he gives at £1250, and the working charges of the plant, which he estimates at £1500 a year. From the figures, he concludes that such a spherical holder worked in this manner would not be economical in comparison with the ordinary type of gasholder.

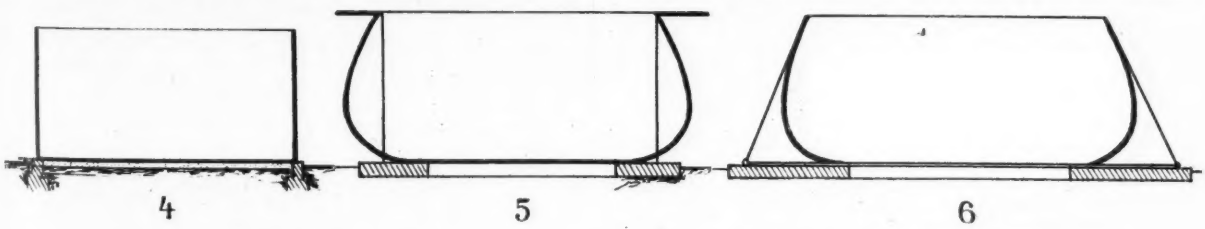
Passing on to the latter, the author remarks that the bell itself has been altered since the early days of gasholder construction only in the directions of increase in size and of division into a number of lifts. The guiding of the bell by rollers has undergone no change in recent years. Generally speaking, small holders are guided simply by radial rollers; larger holders of from 700,000 cubic feet capacity upwards, by tangential rollers; and holders of 1¾ million cubic feet and upwards, by a combination of tangential and radial rollers. Spiral and rope-guided holders have not been introduced in Germany. The guide-framing must correspond with the system of rollers adopted on the bell, and must be sufficiently stiff to withstand deflection and to prevent deformation of the cups and curbs of the bell. After referring to two German patents relating to guide-framing, the author says that



the chief differences between gasholders are found in the method of constructing the tanks.

Masonry or concrete without iron is, he says, generally not suitable for the outer wall of a tank, and will only be chosen when the wall can be supported by loads which will take up the whole or part of the water pressure. This occurs when the tank is sunk below ground (fig. 1), and the support is rendered more effective if the tank wall is sloped inwards (fig. 2). The tensional strains in the wall may, however, be reduced by putting heavy vertical loads upon it, and so providing moments or forces which counteract the water pressure. This result is attained by gasholder houses, where the heavy load due to the building and the load of the water unite, in the portion of the wall lying between any two adjacent vertical sections, to give a resultant of the forces which falls in the inner third of the wall. Reinforced concrete is a material for constructing the wall which is capable of taking up all tensional strains. Ordinarily, however, when it is used, either the iron is not fully utilized or the concrete is overstrained. In the first case, the construction is comparatively costly; in the second case, the structure may warp or fail owing to the inserted iron becoming imperilled through cracks developing in the overstrained concrete. The type of tank shown in fig. 3 is analogous to a type of steel tank described later.

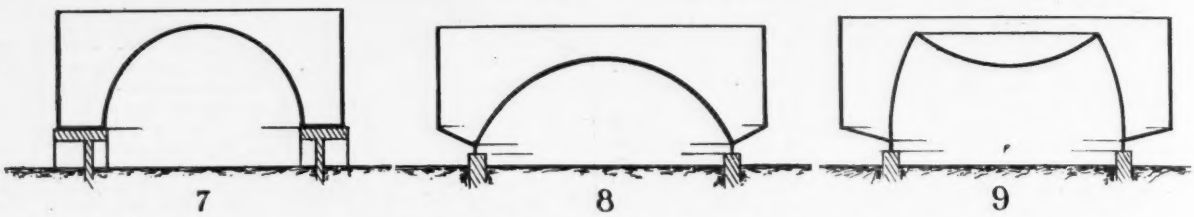
The simplest type of iron tank is the basin shown in fig. 4, which



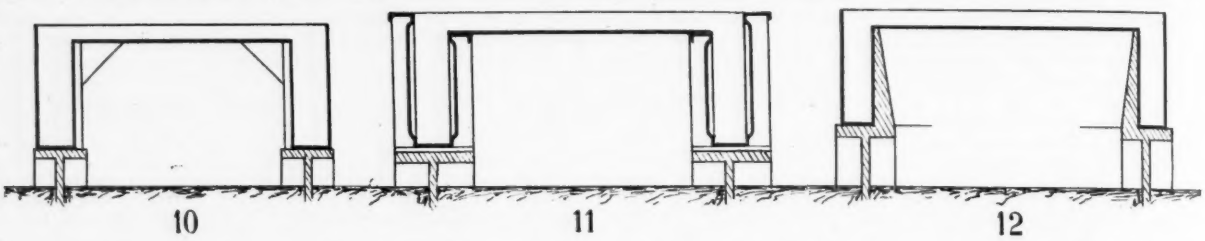
rests everywhere on a level base, and has a cylindrical iron shell. The thickness of the shell or sides is most usually determined in Germany according to the standard formula adopted by the Association of Gas and Water Engineers and the gasholder makers, which formula does not allow for the sides being fixed to the base. Owing to the connection with the base, however, there occur in the lower portions of the sides deflections in the generating lines. Assuming that the sides are set perpendicular to the base, Professor Müller, of Breslau, has calculated the bending strain on the lower rim of the sides. If the effective cross section of the bottom sheets is maintained by the use of two angle rings at their junction with the base, the thickness given by the standard formula is sufficient; but if there is only an inside angle-ring, the bottom sheets must be 1·275 times as thick as the standard formula requires. With large tanks, however, practically impossible thicknesses are thus indicated; and so, while retaining the flat base, a new form has been worked out, which makes the generating lines of the tank walls agree as closely as possible with the sustaining lines determined from the water pressures (fig. 5). The radius of curvature of the generating lines is several times less than the radius of curvature of the ring; so that the ring strains of the wall come into account only slightly, if at all. The forces running

downwards in the direction of the generating lines of the wall are taken up directly by the base, while the upward forces are taken up by the upper rim. A patent for this construction claims a tank of which the wall is hung between rings—the upper edge being supported by vertical pillars. The vertical components of the forces directed upwards are, therefore, taken up by pillars which are in the water and inaccessible; while the horizontal components are taken up by the ring at the top edge.

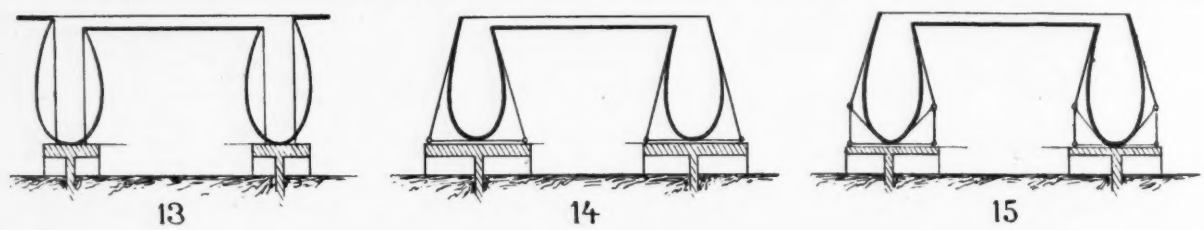
In order to make the base, which for practical reasons is sufficiently strong and is adapted for taking up the horizontal pressure of the water, serve more than hitherto for the transmission of the forces, a tank, for which a patent has been applied, has been devised by the author, having walls curved in vertical section, and with their upper edge shored-up by tangential props, of which the feet are tied to the base of the tank (fig. 6). This construction transmits the whole horizontal water pressure to the base, and so equivalizes it. The props are accessible and on the outside of the tank; and the costly ring is done away with.



The Intze tanks as well as non-projecting tanks with spherical bottoms (figs. 7, 8, and 9), are only suitable, the author says, for small and moderate-sized holders, as they become too costly for large ones. Regard must be paid, however, to the possibility of rupture of the surfaces under compression; and a considerable margin should be allowed in respect of the permissible strain on



them. The theoretical shape must be secured as far as possible by butt-jointing the plates. The lap-plates extending on both sides constitute strong trussing ribs for the surfaces under compression. In regard to annular tanks (figs. 10, 11, and 12), the curved sides adopted for solid tanks may also be applied for both the inner and the outer walls of the ring. They may be either placed between rings and with vertical props, or without the upper rings and with struts tangentially to the upper rim (figs. 13 and 14).



The pressure in the ring of the inner wall is small relatively to the tension in the direction of the generating line of the wall; so that there is no risk of rupture. The middle of the base is absent; and consequently it is not possible to equalize directly in the base the horizontal pressure of water on the walls. But as the horizontal pressures on the two walls act in opposite directions, the small inner pressures are partially neutralized in the annular base in fig. 13, and entirely nullified there in the author's construction—figs. 14 and 15. The sum of all the horizontal forces remaining in the annular base and directed outwards is thus, at the most, equal to the sum of the horizontal water pressures bearing on the two cross sections of the tank, since these two cross sections represent the difference between the vertical projections of the two sides.

The Hamburg Catastrophe.

The author concludes by giving some details of the holder at the Grasbrook works at Hamburg in which the catastrophe on the 7th of December last originated. The local conditions, he says, necessitated the adoption of an annular tank with an accessible interior chamber. The tank might have been wholly of iron as an alternative to the plan adopted of supporting the inner wall of the tank with a concrete ring. Two types of construction for all-iron tanks were available. The first of these would have a cylindrical outer wall, and an inner wall built up of vertical columns, with arched plates stretched between them; the outer and inner walls being united by a horizontal annular bottom. By various devices, the load of the roof is utilized to balance the load on the vertical columns. This type is analogous to the system of construction followed in the Amsterdam gasholder. [See "JOURNAL," Vol. LXXVIII., p. 706.] The second type of construction would adopt the curved sides already referred to. As an alternative to an all-iron tank is the system of stiffening the cylindrical iron inner wall by a ring under compression in concrete or similar material.

The Hamburg authorities decided to adopt the last-named system, of which there were already a number of successful examples. The foundations were executed by the firm of Wayss and Freytag, of Hamburg, and the holder (as already stated) by Herr F. A. Neuman, in conjunction with the "Bamag" firm. The total contract price was about £75,000. It was decided not to use wooden piles for the foundations in view of the level of the underground water, the height at which the tank had to be built in order to allow of trains passing under it, and the risk to an adjoining holder tank of pile-driving to a great depth. After trials, it was settled that reinforced concrete piles, about 50 feet long, should be used. These were driven with a monkey, 5 tons in weight, till they settled only about $\frac{1}{10}$ inch at a blow. The contract for the foundations was placed on Feb. 8, 1908, and they were ready for the erection of the iron structure to be started at the beginning of December, 1908. The chief dimensions of the holder were as follows:—

Outer wall of tank—diameter 243 feet, height 42 ft. 4 in.
Inner ,, ,, ,, ,, 227 ,, ,, 40 ft. 8 in.

The four lifts of the bell were 232 feet, 235 feet, 237 ft. 10 in., and 240 ft. 10 in. diameter, and each 41 ft. 7 in. high. The cups were 20 inches deep. The radius of the crown was 385½ feet. There were 32 guide columns, and four rows of horizontal ties in the framing.

The tank was of the annular type, with a flat roof covered by a little water. The outer wall consisted of steel plates 0·4 to 1·18 inch thick; the bottom of the ring, of wrought-iron plates 0·51 inch thick; the inner wall of wrought-iron sheets 0·20 to 0·28 inch thick; and the level roof of the interior, of 0·20 inch wrought-iron sheets. The vertical seams in the sides were butted with double plates; while the horizontal seams were lapped. The largest rivets used were 1·3 inches in diameter. The inner wall of the tank was stiffened by an annular wall of concrete (mixture 1 to 6), which was 6·56 feet thick at the bottom and narrowed to 1·64 feet thick at the top. The flat roof sheets rested on a course of girders, which were supported by polygonal rings resting on 32 trusses, which were carried on the outside by the annular wall, and in the middle by an iron column. Above the sheet-roof of the tank there was a light iron framing to support the crown of the bell when the latter was grounded. The horizontal pressure of the water was taken up by tension of the outer wall of the tank and by compression of the inner concrete ring. The latter and the horizontal annular base were coated with iron in order to ensure soundness of the tank. The central support of the roof sheets consisted of 16 columns braced together by joists.

The author next describes the principal features of the guide

framing and bell. The latter was in four lifts, each of which was guided at 32 points at top and 64 points at bottom. Each guide carriage had two tangential rollers and one radial. The side sheets of the bell were 4·9 lbs. to the square foot; the crown sheets, 5·7 lbs. The side sheets were lap-jointed, with one row of 0·3 inch (cold) rivets; the crown and cup sheets were lap-jointed with two rows of 0·39 inch (hot) rivets. The pressures thrown by the bell as each lift came into action were: 4·27, 6·9, 8·9, and 10·6 inches. The tank and cups could be heated by steam, for providing which a boiler with 1290 square feet of heating surface was required. Compressed air was used wherever possible in the constructional work. The ironwork was started on Dec. 5, 1908, and by April 1, 1909, the riveting of the two sides of the tank was finished, and the supporting framing of the flat roof and the bottom section of the guide-framing were erected. By May 15 the guide-framing was set up and riveted, and the concrete inner wall of the tank was raised to its full height. The tank and guide-framing were finished by June 21. The construction of the bell was started on June 1, and the whole erection was completed by Sept. 17 last. There was no serious accident throughout the work of construction of the holder.

In regard to the responsibility for the disaster which had overtaken the holder, the author says that as yet blame has not been allocated to anyone. The fire insurance on the two gasholders destroyed by fire has been paid. The Hamburg authorities have deputed the reconstruction of the 7 million cubic feet holder to the two firms which erected it before, and that of the 1¾ million holder to the firm of F. A. Neuman, of Eschweiler. The work of erection of the latter was started on the 15th of July last; but preliminary preparations will still occupy some time with the large holder. Having regard to the catastrophe which occurred last year, the author says that naturally in its reconstruction very great attention will be given to the arrangements, and a specially high factor of safety will be adopted in the structure. On the measures to be taken with this object in view, he cannot speak until later.

PAPERS AND THEIR PREPARATION.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

The expression "paper" is as ambiguous and wanting in point as "article;" and one can imagine a foreigner, in the process of learning the English language, getting very much mixed up over the various colloquial senses in which these words are used. The connection between the "Daily Mail" and a communication submitted to a technical society is not very intimate; but either may be spoken of as a "paper." And the connection between one of the parts of speech and the present deliverance is far from obvious; but either may be called an "article." There is room in our language for additional words that will adequately and distinctively express the nature of a communication to a technical society or to the editor of a magazine. But this is by the way. The purpose now in view is to offer a few remarks on "papers" as submitted to Associations of Gas Managers.

One of the objects or advantages offered to members, either of the parent or any sectional Association, is the facilities afforded for the reading and discussion of papers. As expressed in the Memorandum of Association of the Institution of Gas Engineers, clause 3 sets forth the various objects for which the Institution is established, and among them we find (section *d*) "to invite from the members and others communications relating to gas engineering, manufacture, and administration, and to receive, hear, and discuss such communications at meetings of the Institution or elsewhere." On several occasions, the number of papers read and discussed has been referred to as affording some indication of the vitality and utility of the Institution. Up to comparatively recent times, the list of papers for the annual meeting of the national or parent Association always ran into two figures, and the District Associations would each raise six to twelve in the course of a year; and this when the membership roll had not attained half its present proportions. If the number of papers is to be taken as to any extent indicating the prosperity of the Association, the outlook, as judged by the experience of the last few years, is not satisfactory. The number of communications diminishes year by year; and the vanishing point is now well in sight.

Let us glance at the number of members of the Institution of Gas Engineers, and of the communications submitted by them, as shown in the following table, extending over the last five years; lectures, reports, and papers from "others" not being included:—

Year.	Members.	Papers.	Per Cent.
1906	812	6	0·7
1907	799	5	0·6
1908	804	4	0·5
1909	825	4	0·5
1910	809	3	0·4

The total number of members who appeared at the readers' desk during this period, out of an average of 810, was only 20. Evidently a very insignificant proportion—it is understood this applies to the numbers only—have ever addressed their fellows or contributed to the proceedings. Referring more particularly to the recent meeting, only two, and one of those the Honorary Secretary, submitted papers. But Mr. Bell contributed a valuable *addendum* to the report of the Carbonizing Committee that may be reckoned as a paper.

Mentioning Mr. Bell reminds one that many of the members are now industriously serving the Institution as members of various Departmental Committees, and that up to a very recent date the preparing of papers was the sole outlet for their activity. A worker on a Committee might reasonably claim exemption; but, as a matter of fact, the Committeemen are taking more than their share in regard to the contribution of papers. If the members to day have less leisure, they have more opportunity for collecting material. The writers of papers in the seventies or eighties had not the literature, the apparatus, or the educational facilities that are now available. One might reasonably imagine that, with the expansion and addition to details of the industry that are continually going on, the number of papers would tend to increase. At any rate, one does not care to suggest that none of the silent 806 members have been doing anything in the direction of technical research or advancement during the year ended the 30th of June last, or, at all events, anything that is worthy of being placed on record for the benefit of the profession.

When the District Associations were started, some suggested that they would be likely to injure the National Association, by intercepting papers that would otherwise have found their way to Victoria Street. I do not think that they can in any way be held responsible for the small proportions of the figures in the third column of the preceding table. It is scarcely necessary to make a detailed examination in their case, which is simply a repetition of the experiences of the Institution. The Southern District Association may be referred to as the one with which the writer is most intimately connected. During the life of the South-West Association, now merged in the Southern District, the two Associations occupied the ground at present covered by the one; and between them they were responsible for not less than a dozen papers a year. But now the Southern District Association only devote one meeting per annum to the hearing and discussion of papers; and if the Secretary can get three papers for the meeting, he thinks himself lucky. The difficulty of making up a programme is notorious. Anyone who has served on a Council or Committee knows that at times the President and Secretary are really embarrassed, and the executive are asked to apply their personal influence to the whipping-up of members, and, as a last resort, to stand in themselves, as they are fortunately well qualified to do. Failing assistance of this sort, the *agenda* paper would cut a sorry figure. I do not think any President or Secretary is bold enough to trust to luck—that is to say, to the voluntary assistance of the members—in regard to furnishing the *pabulum* for the next meeting. If it were possible to distinguish between spontaneous papers originated with the author, entirely apart from outside suggestion, and those that have been the outcome of a personal request or a suggestion from a fellow-member, the class first mentioned would be a very small proportion of the whole. No doubt the power to invite papers has not been allowed to lie dormant, or confined to "others," to the exclusion of members; and one would like to know something of the proportion between the number of such "invites" addressed to members and the number of affirmative responses thus secured. It is a question whether the strain upon the persuasive abilities of the executive is not approaching breaking-point, and if it is worth while to continue a state of affairs in which the stop-gap paper, prepared under the disadvantage of short notice, is the leading feature. This remark, of course, is offered in a general way, and is not a hit at any particular meeting or association.

Though the preparation and reading of papers is a matter with which a good 90 per cent. of the members are out of touch, there is no lack of appreciation or question as to the actual value of such communications to the profession at large. If the members will not write papers, they will attend to hear them read; and every Secretary knows that a good *agenda* paper is the same thing as a good attendance. On returning from a meeting, it is no uncommon thing to find a copy of current technical literature containing a full report of the proceedings already to hand. If not, it arrives in a day or two. Our friends of the Press may be credited with ability to gauge and to supply a general demand. There may be papers of a special character that do not attract attention outside a small circle to which they particularly appeal. But I would venture to say that if 90 per cent. of the members never write papers, there are not 9 per cent. who do not read the reports of the proceedings.

Is the paper an old-fashioned, antiquated notion that may be left to drop out of sight with the present generation, or is it a pressing need of the day? Can it be left to die a natural death, or is it desirable to endeavour to infuse more energetic existence into it. I would suggest that unless more interest is taken by the members in section (*d*) of clause 3 of the Memorandum of Association, a valuable aid to the maintenance of an adequate roll of members will be lost; and the loss will be individual, in addition to collective. There appears to be very little appreciation of the personal value, as a means of education, of the work involved in writing a paper. I think many whose position in the profession and past achievements are an evidence of a high order of ability, would acknowledge the aid they have derived from the investigations that have been necessitated in order to illustrate their subject, or to prove a line of argument, in the course of preparing a paper. A gas-works manager who has not acquired the facility of setting his ideas on any subject in order on paper, and either reading them or embodying them in an impromptu speech, in a style that will retain the attention of an average audience, must at times labour under very great disadvantage. He is periodically

called upon to prepare reports for the information of his directors, and to reply to discussions upon them. He has to come before the local authorities, in connection with questions of public lighting and various other matters. He should be able to receive deputations from consumers or from the employees. And there are times when he has to call the whole staff together, and discuss important matters relating to rates of wages and conditions of work. The present-day manager cannot count upon being left in peace to go into the retort-house and earn the dividends which, according to excellent authority, are to be made there. A man who has written a paper, and more or less successfully upheld his views in the teeth of a many-sided discussion, is much better equipped for his work than one of the 90 per cent. The fact that a member dreads, or feels repugnant to, the work of preparing a paper is of itself strong evidence of the need, from the personal point of view, that he should undertake it.

Notwithstanding the suggestion that the branches would rob the stem, it will be found that the few who uphold the credit of the Institution in this respect are also the mainstay of District Associations. In fact, the latter have been an advantage, because a member, having undergone the experience of standing up before a local gathering, and finding that his efforts have been well spoken of, and that nothing terrible has followed, has felt encouraged to face a larger audience at the national assembly. The active paper reader is, as a rule, the least in need of the educational training to which reference has just been made. He is interested in public reading or speaking in other directions; and, being quite accustomed to putting his ideas into speech or on paper, he is not troubled with the sense of incapacity which seems to obsess the 90 per cent., and render them averse to standing up at the readers' desk or to seeing their names in print. This may account for the very common, but none the less erroneous, impression that only an exceptional genius can write a paper, and that it is a special gift confined to the few, like writing poetry or painting pictures. Anyone of ordinary intelligence can write a paper; and it would be a libel on the profession generally to say that only something less than 10 per cent. of the members are able to do so.

There are a few pitfalls that beset the embryo author. Perhaps one of the chief difficulties is the selection of a subject. I remember an old friend who could talk most fluently and capably on almost any detail of gas engineering, and was very successful in his profession. On being pressed to assist at the next Association meeting, he raised several small objections, which were disposed of, and finally said he could not think of a subject. If I would find the subject, he would find the paper. After a little further inquiry, a suitable subject was selected; and the result was a communication of acknowledged value that elicited a good discussion. It is putting the cart before the horse to determine to "write a paper" and then to cast about outside for a subject, going perhaps to the lists of papers already read, or to the index of the "JOURNAL." At a later stage, when the subject is somewhat advanced, it will be desirable to look up what other people have had to say about it. A manager requires to look at home for the subject, among the things with which he has been most closely engaged and associated. The material to be worked upon may or may not be in existence. The details required may exist in the form of special memoranda, or the project may involve the opening-up of some track hitherto unexplored, that means commencing *de novo*. The practical man of the present day usually follows the first course, and utilizes matter that has accumulated in the course of his recent occupation. Probably he has neither the time nor the special facilities for carrying out pure research. Whatever the matter selected, the closer one can get to it, and the larger the amount of detail worked out, the greater the prospect of a result that will be satisfactory both in a personal and in a general way. It is better to take too narrow than too wide a field. One is not so likely to fall into the error made by one of the 90 per cent., who, after an immense amount of persuasion, was induced to take part in a discussion on a paper furnishing some practical lessons in retort-setting. After a few disjointed sentences, he said the retort-setting was important, but good washing and scrubbing were equally so, and drifted off into a disquisition upon ammonia, and the money lost by allowing even a small proportion of this impurity to get beyond the inlet to the purifiers.

A paper should not be so diffusive or exhaustive as a magazine article or a chapter in a technical treatise. An original and distinctive style is likely to attract more attention than a copied one. The writer should, above all things, seek to be himself, and not somebody else. He can work more freely and naturally in his own clothes, even if they are homely in appearance and fit, or a little frayed at the elbows and knees, than in a more pretentious vesture that was evidently not made for him. In some parts of the country, it is a usual practice among the labouring classes to bedeck themselves with all the jewellery they can borrow when they are about to sit for a photograph. The author of a paper will do well to avoid a similar blunder. I have seen papers that are so obviously copies, that the original could be safely indicated; and expressions that may be appropriately used by a leader in the profession, are out of place in a communication from a young, and to some extent inexperienced, writer.

In Dickens's "Pickwick Papers," it is related that a young man, who was a member of a debating society, being requested to propose that a picnic should be held on a certain date, introduced his subject by a *résumé* of the law relating to picnics, from the time of William the Conqueror downwards, with a digression touching upon the legal position of the picnic in other countries. A paper that will lead to a good discussion is not too heavily loaded with irrelevant details; and one of the best ways of smothering discussion is to tire the audience, by anticipating and dealing at length with every conceivable objection. Moreover, the writer should not so far exhaust himself as to have nothing left for the reply. The last word carries most weight; and a competent reply will receive more attention than the original communication. A good plan is to keep a card or two up one's sleeve in the shape of a few telling points that can be introduced into the reply. Diagrams are of great value if used judiciously. They will explain matters of detail that cannot be satisfactorily put into words. But they should be confined to leading features of the subject, and not be too numerous.

COKE MANUFACTURE & PRODUCTS RECOVERY.

Early in the present year, a paper on this subject was read before the Newcastle Section of the Society of Chemical Industry by Mr. Andrew Short, B.Sc. The text of it, fully illustrated, is given in the current number of the "Journal" of the Society, from which we extract the following particulars.

The earliest method of coking coal was very crude, and consisted simply in piling up the coal in the form of mounds or rectangular heaps, covering the heap over with breeze, igniting the coal, and allowing it to smoulder—much in the same way that charcoal is manufactured at the present time. The heat produced was sufficient to drive out the volatile matter, which burned, and ultimately a heap of coke was obtained. Later, these heaps were surrounded by walls having air passages at various places. The brickwork was built in the form of stalls, in which the coal was placed, covered with a layer of loam to prevent excessive waste by combustion of the upper layers. Holes were pierced in the lower portion, the coal was ignited by brushwood, and the rate of combustion was regulated by opening or closing the air-holes in the walls.

Though these methods produced good coke, they were obviously wasteful; and ultimately what is known as the "beehive" oven was evolved. This type of oven is more economical, and is largely in use at the present day, both in England and America, since it produces excellent coke, which is much prized for its silvery appearance and dense, hard nature. But as air is admitted to the charge, in order to complete the combustion of the volatile matter, a certain amount of the coal or coke is burnt and lost. A coal which, heated in an entirely closed vessel, would yield (say) 75 per cent. of coke, yields only 65 to 67 per cent in a beehive oven; the loss being due to combustion. In order to avoid this loss, ovens have been devised in which the coal is baked in a closed chamber; no air being admitted into the oven itself. This kind of oven is known as the retort-oven; and among the earliest and most successful types were those of Coppée and Appolt, introduced in 1861 and 1862 respectively.

The retort type of oven resulted in a higher yield of coke than the beehive type; but it has been still further improved upon by the recovery of the tar, ammonia, and benzol from the products of distillation. The successful recovery of these constituents marks the development of the more purely chemical side of the industry; and the methods evolved for their recovery have reached a high state of perfection. The industry now constitutes an important branch of the chemical trade. Though the beehive type of oven does not lend itself to the successful recovery of bye-products, several attempts have been made to adapt it to recovery processes, among which attempts those of Jameson and Aitken may be mentioned. Pernolet also designed an oven which was practically a closed beehive oven. These processes have not been successful.

The retort-oven, however, lends itself well to the recovery of bye-products; and it is this type of oven which has come to the front of late. The first successful attempt in the bye-product recovery process was made in 1862 by Carvès, who modified and adapted Knab's oven for bye-products recovery. Knab had in 1856 designed a retort-oven heated by flues placed under the floor; Carvès added flues in the side walls. Simon then added a simple form of recuperator; and this design of oven has been extensively used. The bye-products recovery process, however, did not make much headway, at least in England, until 1881, since which date the progress has been rapid, but not so rapid as on the Continent, where no beehive ovens exist to-day.

The type of oven now in use is almost exclusively the horizontal oven similar to the original Simon-Carvès and Coppée ovens, and consisting essentially of a horizontal brickwork chamber about 33 feet long, 6 ft. 6 in. to 7 feet high, and 18 to 24 inches wide, in which the coal is coked. This is provided with heating flues, built into the side walls; and movable doors are provided at each end of the oven. A hole in the crown leads away the gaseous products of distillation to a common main. The gases, after removal of the bye-products, are led back to the ovens and burnt in the side flues in order to carry out the process of coking. The ovens are usually built in batteries of 25 to 60; and plants are in existence which comprise up to 500 ovens.

Horizontal retort-ovens may be divided into two distinct classes: (1) Ovens with horizontal heating flues—Simon-Carvès type;

(2) ovens with vertical heating flues—Coppée type. These again may be subdivided into (*a*) waste-heat ovens—*i.e.*, those in which all the waste heat is converted into steam under the boilers; and (*b*) regenerative ovens, where surplus gas is required.

In the original type of Simon-Carvès horizontal flued oven, the walls are hollow, being formed of channel bricks, which divide the partition wall between two contiguous ovens into four horizontal flues. Under the oven runs a sole flue; and this leads up to the top horizontal flues. The gas is admitted at the end of the sole flue along with air for its combustion. The flame travels along the sole flue up to and along the top horizontal flue, then through the lower flues in turn, and finally into a simple recuperator, consisting of two waste-gas flues built in between three air-flues, in which the air is preheated before coming into contact with the gas. Alternate ovens exhaust their waste gases into the two waste-gas flues; there being two chimneys provided for each respective battery of ovens. This type of Simon-Carvès oven has recently been superseded by an improved type.

Semet-Solvay ovens have a somewhat similar arrangement of side flues, with the exception that each oven has its own set of flues. The ovens are separated from each other by a solid wall; and the flues are placed upon either side of this wall. The advantage of this method is twofold. In the first place, the solid wall in question, dividing each oven from its neighbour, acts as a support for the superstructure, and relieves from undue strain the flues, which must be kept gas-tight. It also acts as a storage for heat, and tends to maintain the temperature of the oven when cold coal is thrown in, or during temporary stoppages of the gas supply. A feature of the Semet-Solvay oven is the use of small bricks for building-up the flues. It is claimed that this minimizes the danger of cracks in the flues, with consequent leakage of the gas from the ovens into the flues and loss of bye-products. The flues in these ovens are usually four in number. The gas and air enter at the end of the top flue, travel along this and slowly downwards along the other three in turn, and finally pass along a sole flue into the main waste-gas flue leading to the boiler. The air is generally led through flues built underneath the oven, and is heated to an extent before entering the combustion flues.

The Huessener oven was the first bye-product oven built in Germany. This type also has a separate set of flues for each oven, with an intervening wall. The flues are built up of tongued and dovetailed bricks, which are accurately fitted to each other. In this type of oven the gas enters at the sole flue, of which there are two to each oven, one serving each set of side flues. The gas and air, on entering the sole flue, travel along underneath the oven and rise through a vertical flue to the top flue. The flame then traverses the other flues, reinforced by more gas and air if necessary, and finally passes into the main waste-gas flue.

Coming to vertical-flued ovens, the Coppée modern type has the flues placed somewhat similarly to those in the original type. The side wall is composed of a series of vertical flues, with a flue running longitudinally above and below. The gas is forwarded into the lower horizontal flue through a bunsen mixing-tube, and issues from a series of holes, each corresponding to a vertical flue. Enough air is mixed with the gas to give a non-luminous flame. Combustion takes place in the horizontal chamber; the necessary air for the completion of the combustion being admitted into it. Dampers are placed at intervals to regulate the supply. The hot gases pass up the vertical flues, along the top horizontal flue, and down two vertical flues in the centre, thence through ports into the sole flue, and on to the waste-gas main flue.

In the Koppers oven there are from 30 to 35 vertical flues, the supply of gas to each of which can be regulated. The gas is led into the flues by means of a fire-clay pipe running the whole length of the side walls, with adjustable orifices of ingenious type leading to each flue. An air-distributing channel runs underneath the oven, with ports to each gas-nozzle, where it mixes with the gas, and the flame passes into the vertical flues. The air is controlled by means of dampers at the top of each flue; and the products of combustion pass along the upper horizontal flue, down two vertical flues at the end of the series, and on to the main flue. The new Simon-Carvés type is designed to overcome this adjustment of dampers, by placing regulators on the sides of the oven. The gas is led through several pipes to the various points in the oven, and regulated to maintain the necessary temperature. The air and gas are regulated by dampers, accessible from the ends of the oven; and the heat in the flues can be controlled from this point. The Otto-Hilgenstock oven is an extremely simple and effective design. The gas-flues are replaced by a row of from 15 to 16 large bunsen burners, which heat up the vertical flues. The gas supply is under easy control, and the air is regulated by a damper placed at the opening leading to the main flue.

The advantage of vertical-flued ovens over the horizontal-flued ovens lies in the ease with which the heat can be regulated at various points along the oven by the admission of more or less gas, according to the temperature required, at different parts. Also, owing to the shorter flues, the gases have a shorter distance to travel, and consequently a lower chimney draught is necessary. This avoids the drawing-in of gases from the oven into the flues, with consequent loss of bye-products. Most of the vertical-flued ovens can be adapted to use with regenerators of the Siemens type.

The most successful of the early regenerative ovens was the Otto-Hofmann, which was practically a Coppée oven fitted for bye-product recovery and with regenerators. This type of oven has been largely used on the Continent and in America; but it has the disadvantage of causing expansion and contraction of the walls at frequent intervals, which ultimately cause leakage of gas. Ovens have been designed which avoid this to a certain extent if not almost entirely. In the Coppée regenerative oven, the side wall is divided into five chambers, and two sets of gas-supply pipes are provided, which are used alternately. Each chamber has six vertical flues, up three of which the gas travels, and passes down the other three alternately. Thus the contraction and expansion are not so severe as in the case of the Otto-Hofmann type. The Collin oven still more completely equalizes the heat; for in this case the only alteration in the flow of gases is that of direction in the individual flues. Each battery of ovens has usually a common set of regenerators, placed longitudinally, running underneath the whole length of the battery. The Koppers ovens, however, are so designed that each oven has its separate regenerator, built underneath the sole of the oven, so that repairs to any regenerator can be carried out without interfering with the working of the battery as a whole.

Of late years, the question of carbonization in vertical retorts has received considerable attention in the gas industry; and experiments in this direction have been rewarded with success. [In this connection, the author refers to the work of Messrs. Settle and Padfield, Woodall and Duckham, Glover and West, and Bueb; and he quotes the figures given by Mr. E. Körting, in the "JOURNAL" for Jan. 14, 1908 (p. 93), showing the results obtained in a battery of 84 Dessau retorts at Mariendorf, in comparison with inclined and horizontal retorts. He also cites the report of Mr. Broadberry and Dr. Colman to the Institution of Gas Engineers, published in the "JOURNAL" the following June, in support of the statement that the yield of tar is greater and of better quality, and that of ammonia higher, with the vertical than with the horizontal retort.]

Encouraged by the results obtained in gas-retorts, coke-oven makers have turned their attention to vertical ovens; and the outcome has been the Elliott-Jones oven, which has been proved so successful on a working scale that a battery is about to be constructed. The design is somewhat similar to the Appolt oven. The tar is much thinner, and contains much less free carbon and naphthalene, than ordinary coke-oven tar. The coke also is of excellent quality.

The use of bye-product ovens has very largely increased in England during the last ten years, and is still increasing; many iron-works possessing ovens built in close proximity to blast-furnaces. [The author describes them in detail.] The method of recovery up to the end of the last year or two has been very similar in the various systems of coke-ovens. But it has several disadvantages. In the first place, the apparatus is somewhat complicated and costly. Ammonia stills and saturators are expensive, and require a considerable amount of attention and upkeep. Also a large quantity of fresh, cold water is necessary for cooling and scrubbing the gases, and steam for distilling. Again, more especially in inland places, the waste liquors from the ammonia stills, containing poisonous substances, such as calcium sulphide and sulphocyanide, are, even when clarified, too poisonous to be run into streams or canals. In some parts of the country, the disposal of this liquid is an extremely difficult question. Efforts have been made to simplify the recovery plant, and to avoid, either partly or wholly, the formation of ammoniacal liquor, and consequently to avoid the injurious still waste. These efforts have been successful, and now several systems are in use, notably the Koppers and the Otto, both of which are being installed in England. The methods consist of the direct recovery of the ammonia; and remarkable developments have been made during the last year or so.

In the Koppers system, the gas is first cooled down to a temperature of about 25° C., and passed through an exhauster to a tar-extractor. This removes the tar, and some virgin ammonia liquor is obtained. The gas is then heated-up by being passed through what is usually the air space in the first cooler. Here it is reheated, and then passed on to a large lead saturator and bubbled directly through a bath of sulphuric acid. At the same time the virgin liquor collected from the cooler is treated in a small still; the ammonia being driven out and mixed with the gas. There is very little effluent liquor, and the salt is free from tarry matter, which proved a source of trouble in earlier direct-recovery processes. The gas is passed into the saturator at a comparatively low temperature, and the salt contains remarkably little free sulphuric acid.

The Otto system is still more simple and very ingenious; for the gases leaving the oven are conveyed hot into the saturator, and no condensation of liquor is obtained. This is a distinct advantage, since many oven plants are charged with washed coal containing from 10 to 12 per cent. of water. Thus 120 ovens carbonizing wet coal would produce about 60 tons of virgin liquor per day; and the disposal of the still waste from this quantity would be a difficult matter. In this system, the gases leaving the ovens are passed into a vessel in which they are sprayed with tar. These tar sprays remove the tar from the gas at a temperature above the dew-point of the gas, and thus no water is deposited. By this simple means the gases are freed from tar, and then an exhauster draws them off, and forces the gas through a large lead-lined saturator in which the ammonia is absorbed by sulphuric acid, the sulphate formed being free from tarry matter and of good quality. The gas is afterwards passed on to the burners, unless it is required to remove the benzol. And only then are coolers

necessary. No ammoniacal liquors are formed; and any condensed water, since it contains no lime salts, can be used for quenching coke, &c. Several plants on this system are working at present in Germany, and some under construction in England will soon be in operation.

Since coke-oven gas approaches very nearly to the quality of ordinary lighting gas, the question of its utilization for this purpose has been raised at various times, and in America attempts have been made to adapt coke-ovens for the purpose. Dr. Schniewind has dealt with this question very fully in a paper read before the Gas Section of the Engineering Congress at Glasgow in 1901,* showing how the quality of the gas varies at different times during the period of carbonization. Recently arrangements have been made with a view to supplying the district of Little Hulton with gas of 550 B.Th.U. and 14-candle power, in quantities up to 400,000 cubic feet per day, from the coke-ovens at the Earl of Ellesmere's collieries. A scheme is also being brought under notice in the Ruhr district of Rhenish Westphalia, where coke-ovens exist in large numbers, to centralize a gas-station supplied from the various coke-oven plants, which if successful would result in a cheap gas supply, and avoid the costly undertakings of many gas-works in the district.

* See "JOURNAL," Vol. LXXVIII., p. 691.

RAISING A HIGH-PRESSURE WATER-PIPE.

In regrading one of the streets in the business section of Seattle, a town in Washington Territory, it was necessary to raise a 1800-feet length of 20-inch cast-iron water-main operating under a pressure of 130 lbs. per square inch. The position of the main was such that it was impracticable to cut it out of service while the raising was in progress; so the decision was arrived at to undertake the work without interfering with the operation of the pipe. The street in which the pipe was laid had a dip in grade about midway on the length of pipe it was necessary to raise. The street improvement was made to remove this dip, and to secure a uniform grade of 4·9 per cent. The pipe was laid at a depth of 4 feet below the original street surface, and the maximum raise required was to be about 13 feet above this surface; making a total of 17 feet. From this maximum the amount of change tapered off gradually towards both ends of the length of main. The particulars of the work here given are taken from "Engineering Record."

The scheme of raising adopted was to carry up the whole length of the pipe by means of jack-screws and cribbing. The trench was first opened, and the pipe brought to the surface in this manner. Then shoring was put across the trench, and the raising continued until the final position was reached. A cross-timber was placed near the bell end of each section of the pipe, to provide a bearing for a pair of jack-screws seated on a crib of 6-inch square timbers built up in cob-house fashion. Side struts were used at intervals to maintain the alignment. Extra cribs were placed under valves and specials. Enough men were employed to turn the jacks so that 60 feet of the pipe could be raised simultaneously. The work was started at one end by raising about 60 feet of the pipe 1 inch. Then the next 60-feet length was raised to this extent, and so on continuously to the opposite end of the work. As soon as that end was reached, the men worked back again, and so on until the pipe was up to the proper height. One man was stationed at each jack, and all the men worked to a signal from the foreman; so the jacks under the 60-feet lengths in which the raising was handled were turned at a regular rate. As soon as the jacks were extended, a 6-inch square timber was slipped under the pipe at each crib, to take the load until the jacks could be removed and another storey added to the crib. The jacks and timbers were consequently manipulated so that the pipe was never unsupported at any point. After the pipe had been raised to the final grade, a framed timber bent was built under each section, to carry it until the fill was completed. While the work was in progress, practically no leakage occurred at the joints, though some of them had to be caulked occasionally. After the pipe was out of the trench, the rest of the raising was done in fourteen days.

Tar Treatment of Roads.—In the course of his annual report to the Birmingham City Council, the City Engineer and Surveyor (Mr. H. E. Stilgoe, M.Inst.C.E.) says that the total area of macadam surfaces tar-sprayed during the year was 893,062 square yards, and that the areas sprayed second and third times were 98,824 square yards—making an area of street equal to 794,238 square yards, comparable with the length of 62 miles 2 furlongs 88 yards. The cost of the work was £2165; being at the rate of 0·582d. per square yard, compared with the previous year's results—viz., 44¼ miles, being 578,286 square yards, at 0·876d., equal to £2113. The difference in the cost is accounted for by the work being carried out by the Corporation's own staff, and not partly by contract, as in the previous year. The greater portion of the work was done by two 1000-gallon tar-spraying machines hauled by steam-rollers, and a smaller portion by two single-horse machines and a hand-sprayer. Mr. Stilgoe claims that the advantage of the application of tar to the surface of macadam streets for the purpose of preserving the surface and the reduction of mud and dust is established beyond all dispute, and is a great source of comfort to the users of, and frontagers to, the streets.

WATER SUPPLY OF THE METROPOLIS.

Seventh Annual Report of the Metropolitan Water Board.

We have received from the Clerk to the Metropolitan Water Board (Mr. A. B. Pilling) a copy of the seventh annual report, dealing with the work of the Board in the year ended the 31st of March last.

The report opens with some explanatory remarks on the constitution of the Board, and then sets forth its financial position. On the 1st of April, the capital debt was as follows: Metropolitan Water "A" Stock £6,060,165, interest £181,805; Metropolitan Water "B" Stock £35,510,521, interest £1,065,316; redeemable debenture stocks £7,217,838, interest £216,911—total stock, £48,788,524; interest £1,464,032. In addition to this, the Board are under obligation to pay certain annuities and rent charges (including the Crown "clog" of £400) which amount to £9900; making an annual interest charge of £1,473,932, which is equivalent to 4·3d. per 1000 gallons of water supplied.

From the section of the report furnishing particulars of the sources of supply, we find they continue to be four—viz., the Thames and the Lea; gravel beds adjoining the main stream of the Thames and other gravel beds at Hanworth; natural springs; and wells sunk in the chalk or other strata in the Lea Valley, on the north of the Thames, in Kent, and at certain other points south of the Thames. In the twelve months ended March 31 last, the Thames furnished 58·19 per cent. of the Board's total supply, compared with 57·27 per cent. during the previous year. The daily average quantity gauged at Teddington was 1445·2 million gallons—an increase of 461·5 million gallons compared with 1908 9. The daily average total abstraction from the river was 136 million gallons. The daily average natural flow at Teddington was therefore 1581·2 million gallons during the year, compared with 1118·4 million gallons in 1908-9. The total volume abstracted from the river was 49,641·2 million gallons, or 462 million gallons more than the preceding year. Compared with that year, there was an increased average daily abstraction from the river of 1·3 million gallons last year. Of the 136 million gallons daily average quantity abstracted by the Board and the Suburban Companies, the Board drew 133·6 million and the Companies 2·4 million gallons. The percentage of the river's natural flow abstracted by the Board was 8·45, and by the two Suburban Companies 0·15, or 8·6 per cent., compared with the total abstraction of 12·04 per cent. in the year 1908-9. There was a decrease in the total quantity of water abstracted from the River Lea by the Board equal to an average daily decrease of 0·412 per cent.

The total volume of water supplied during 1909-10 was 82,365·8 million gallons, compared with 81,823·9 million gallons in 1908-9—an increase of 541·9 million gallons. The average daily supply was 225·7 million gallons; the figure for 1908-9 being 224·2 million gallons. The southern district took the largest proportion of the total supply—viz., 26·96 per cent.; and the Kent district the smallest—9·09 per cent. The eastern district consumed 19·91 per cent. of the total supply; the New River district, 19·25 per cent.; and the western district, 24·79 per cent. The month of maximum average daily supply was May in two of the districts and August in three. The month of minimum average daily supply was December in the eastern district and February in the southern, but March generally. The difference in the total average daily quantity of water supplied between the maximum and minimum months throughout the whole area was 31·5 million gallons, or a difference of 4·6 gallons per head per day.

The total estimated population supplied by the Board at the close of the year—viz., 7,108,504—represented 15·6 per cent. of the population of Great Britain and Ireland. This population is nearly equal to that of the two kingdoms of Norway and Sweden, about the same as the Dominion of Canada, two millions more than Australia and New Zealand combined, and larger by about a million than the whole population of Scotland and Wales. Within the County of London, the main increase occurred in the southern district—viz., 12,345; and there was a decrease of 1312 in the western district. In the area outside the county, the greatest increase again took place in the eastern district—viz., 12,602; the total increase outside the county being 47,365, or 2·1 per cent. There was a decreased supply of 0·07 gallon per head per day as compared with the preceding year. The average population is estimated to have increased 0·9 per cent., and the average number of services 1·05 per cent. The largest increase per head per day occurred in the eastern district—viz., 0·95 gallon, or 3·45 per cent. The largest decrease was in the southern district—viz., 1·08 gallons, or 3·16 per cent. For the whole area, the average daily supply per head was 31·87 gallons. In 1908-9, the average daily supply per head was 31·94 gallons; in 1907-8, 31·55 gallons; in 1906-7, 32·84 gallons; in 1905-6, 32·31 gallons; and in 1904-5, 33·54 gallons. Approximately, 55 per cent. of the total population was supplied from the Thames, 24 per cent. from the Lea, and 21 per cent. from wells and springs. The total number of services supplied at the end of the year was 1,094,801—an increase of 11,325 over the preceding year. The average daily supply per service was 206·12 gallons, compared with 206·9 gallons; and the average population supplied per service was 6·47, against 6·48 in 1908-9. The increase in the number of services on the constant supply during the year was 10,635, or 1 per cent. The proportion of supplies on the constant system at the close of the year was

97·72 per cent., compared with 97·74 per cent. in the preceding year. The eastern and western districts are entirely on constant supply. In the Kent district, the percentage of constant supply is 99·71; in the southern district, 91·52; and in the New River district, 99·97. In the last-named district, constant supply is given to the whole of the Metropolitan portion, and to all the outside area except a few houses in Great Amwell.

In the section of the report dealing with storage, attention is called to the testimony borne by Dr. Houston, the Board's Director of Water Examination, to its value in improving the quality of water; and it is stated that he has still further substantiated this important fact, both by the routine work of his department and by his special research work. The effective amount of storage and subsidence reservoir capacity for unfiltered water possessed and in use by the Board at the end of the year was as follows:—

	No.	Area in Acres.	Total Capacity in Million Gallons.
Thames Valley	30	918·50	6345·5
Lea Valley	17	530·25	2499·2
	47	1448·75	8844·7

No addition was made during the year. The total number of filter-beds is 168, of 166·51 total acreage, or 0·86 acre per million gallons average daily supply of filtered water; the latter figure ranging from 0·62 in the New River district to 1·01 in the western district. The average monthly rate of filtration per square foot per hour during the year varied from 0·84 gallon in the Grand Junction district to 2·08 gallons through the Lea Valley supply beds of the New River district. At Long Ditton (southern district), two filter beds, of 1¼ acres each, were completed and brought into use in June, 1909; and three, of the same dimensions, in April, 1910—leaving one to be completed. In the New River district, 4¾ acres of filter-beds are contemplated.

The total number of service reservoirs for filtered water (as distinct from storage reservoirs for raw water) is 83, of 311·072 million gallons total capacity. Only two, at Hanger Hill, near Ealing, of 53 million gallons capacity, are uncovered. The remarkable covered reservoir at Honor Oak, of which some particulars were given in the Board's sixth annual report, was formally opened by the Lord Mayor (Sir George Wyatt Truscott) on May 5, 1909. The four sections of the reservoir (an illustrated description of which was published in the "JOURNAL" for May 11 last year) were filled with water on Nov. 9; and the reservoir was brought into use for the first time on the 14th of March last. Its actual capacity is 56,322,000 gallons. The source of supply to it is a 42-inch pipe connected to the Board's 42-inch main which conveys filtered water from the pumping-station at Hampton to the Nunhead reservoirs, a distance of about 17 miles. The following figures show the increases which have taken place under the Board in the active equipment of water-works since the transfer of the undertakings:

	Before June, 1904.	At March 31, 1910.
Storage reservoirs for unfiltered water	57	62
Acreage of ditto	886	1497
Capacity of ditto in million gallons	4077 6	8913·6
Service reservoirs for filtered water	74	83
Capacity of ditto in million gallons	241·5	311·1
Filter-beds	137	168
Acreage of ditto	140	166·5
Engines	235	264
Horse power of ditto	32,177	38,380
Miles of water-pipes	5,759	6,258

In the section of the report which deals with the miscellaneous work of the Board, reference is made to the various legal decisions given in the course of the twelve months—including the South Suburban Gas and the Brighton and South Coast Railway cases, both of which have been reported in the "JOURNAL." The important work of the Director of Water Examination (Dr. Houston) is also dealt with; and other matters touched upon are the rainfall records furnished to the Board by Dr. H. R. Mill, the uniform scale of charges, &c. The total rateable value of the Board's properties (including the mains) is £1,192,184, distributed as follows: Bucks, £791; Essex, £77,712; Herts, £14,337; Kent, £32,311; London, £637,698; Middlesex, £286,524; Surrey, £142,811.

The report closes with a few remarks on the future water supply of the Metropolis. The report issued two years ago contained the resolutions passed by the Board on Dec. 6, 1907, in reference to the question of the sources of supply in relation to their capacity for dealing with the future requirements of the Metropolis. The first resolution committed the Board "to seek parliamentary powers to enable them to provide additional supplies from the Thames for as long a period as is economically practicable." Since the passing of the resolution, the Works and Stores Committee and the Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.) have given the closest consideration to the problem presented by the reference; and early this year an exhaustive report was submitted by the Committee on the subject, in which they recommended the adoption of a scheme for the construction from time to time of additional reservoirs in the Thames Valley, in the vicinity of the existing Staines reservoirs. The main feature of the scheme carries out the principle of the construction of storage reservoirs contained in the report of the Royal Commission presided over by Lord Balfour of Burleigh in 1892-3. The complete scheme submitted by the Chief Engineer includes five reservoirs, having a total capacity of about 20,900 million gallons, and sufficient, with the existing works, to ensure, during a drought as severe as that which occurred in the years 1898-9 and 1901-2, a supply of 35 gallons per head per day for a total population of 12 millions, which it is estimated the Board may have to provide for in the year 1941. This report was accompanied by reports from the Finance and Water Examination Committees dealing with the financial considerations affecting the question and the value of storage; and they were adopted by the Board at their first meeting after the close of the year under review.

Accompanying the report (which is signed by Mr. Pilling) are appendices containing a collection of tabulated statistics, and also Dr. Mill's report on the rainfall in the Thames and Lea Valleys.

REGISTER OF PATENTS.

Recording Gas Calorimeter.

BEASLEY, C. H. & F. G., and BRADBURY, R. H., of Oldbury.

No. 16,647; July 16, 1909.

This gas calorimeter is of the type in which the quantity of heat developed by the combustion of a known amount of gas in unit time is transmitted to a continually flowing body (such as water), whose consequential increase in temperature is measured differentially by means of thermometers at the points where the water enters and leaves the appliance. This calorimeter is so constructed that, in addition to providing for the "expeditious and accurate" estimation of the calorific value of gases (particularly gaseous fuels), it also admits of the products of the combustion of the gases being analytically examined during the time that a calorimetric test is being made; while all variations in the temperature of the flowing water are automatically indicated and recorded.

The calorimeter (illustrated, p. 526) is so made that the gas to be examined, together with the requisite quantity of air, is forced into the instrument at considerably above atmospheric pressure, and is burnt in a burner enclosed within a water-jacketed combustion chamber through which a constantly flowing stream of water is caused to circulate. This combustion chamber has only a single outlet, consisting of a pipe fashioned into a coil or other suitable form, and entirely contained within the water circulating chambers.

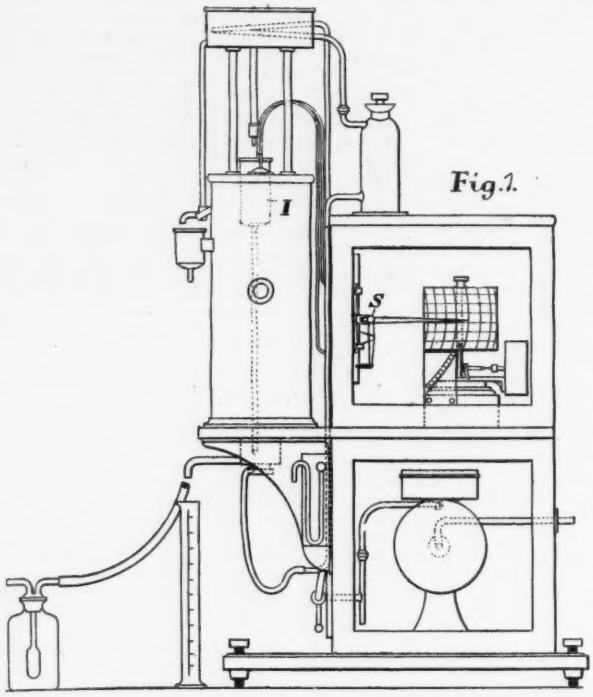
Owing to the fact that the gas is supplied and burnt under pressure, the products of combustion are forced to travel downwardly through the outlet coil at a constant rate, which can be readily varied as desired, and are cooled within the coil to the temperature of the water where it enters the jackets or chambers. This is effected by providing the entrance for water at the bottom of the coil-jacket and compelling it to flow through upward, or in the inverse direction to the travel of the products of combustion. Further, the fact that a pressure exceeding atmosphere pressure is maintained in the combustion chamber also provides that the burnt gases, after their passage through the water-heating coil, can be forced to traverse any form of apparatus for chemically analyzing them, "from which it follows that gases can be simultaneously, or at one operation, tested to determine both their calorific value and their combustible constituents."

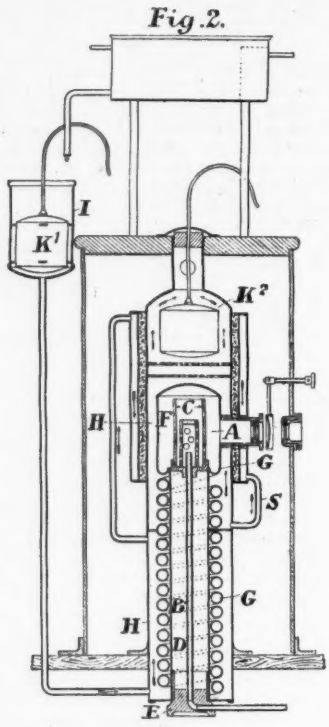
To provide for measuring of the differences in the temperature of the water at the entrance to the circulating chambers and at the outlet therefrom, a differential thermometer system is employed, consisting of two thermometer bulbs, each connected by a fine-bore pipe to an aneroid box. Each bulb, with its associated aneroid, is filled with oil or other liquid susceptible to expansion and contraction under variations of temperature. One bulb is immersed in the water at the entrance to the jacket, and is under the influence of the minimum temperature; while the other bulb is immersed near the outlet, where the water attains its maximum temperature by virtue of the heat taken up from the walls of the coil and combustion chamber. In order to indicate and record all variations in the differences between the minimum and maximum temperatures as measured by the respective thermometers, both the aneroids are mechanically connected, through a system of levers, with the shiftable fulcrum of a pen-staff forming part of a recording device, whereby the fluctuations are recorded on a moving band of paper driven at a constant rate by clockwork.

The instrument also comprises an arrangement for automatically maintaining a constant rate of flow of water past the combustion chamber and heating coil, and which consists of an elevated tank wherein a constant head is maintained by the usual weir method, and from which the water flows at a constant rate from a jet into a deep cup that forms the entrance to the water-circulating system and contains the bulb of the minimum thermometer. Provision is also made whereby, in the event of any increase of resistance to the flow of the water through the instrument, such increase is compensated for by the head of water that builds itself up in the cup.

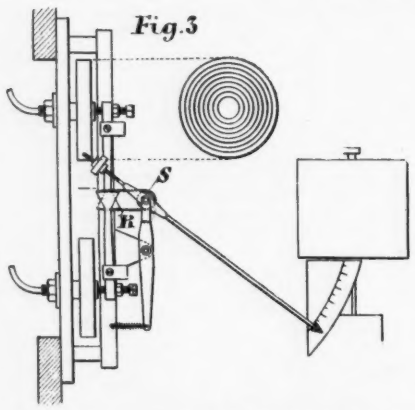
Further, provision is made whereby the gas and air to form the combustible mixture, and the water used in making the tests, can be readily brought to a uniform temperature before they pass into the instrument, which is effected by arranging within the elevated water-tank a coil of a few turns, through which the gas and air are forced before passing to the burner in the combustion chamber, and are thereby brought to the same temperature as the water in which the equalizing coil is immersed, and which proceeds from the tank to the jackets enclosing the combustion chamber and heating coil. To provide for the maximum saturation of the gas and air prior to combustion, or to bring them to the same degree of saturation as the exhaust burnt gases, the gas and air are passed through a chamber containing water interposed between the injector and the temperature-equalizing coil. This obviates the necessity of making tests to correct the records of the instrument for humidity.

Fig. 1 illustrates the connection between the different parts, including the gas, air, and water temperature equalizer, the gas and air saturator or maximum humidifier, the arrangement of the aneroids pertaining to the differential thermometer system, and the mechanical





Beasley's Gas Calorimeter.



means for automatically recording the fluctuations in temperature differences between the minimum and maximum thermometers. Further, it exemplifies the manner in which the invention provides for the analytical examination of the products of combustion, and it also shows a convenient disposition of appliance for controlling the delivery of gas to the burner so as to ensure the constant delivery of a given weight of gas in a given unit of time. The arrangement for taking up the appropriate quantity of air is shown; also the injector device whereby the gas and air are forced through the humidifier and temperature equalizer to the burner, and whereby also the pressure is maintained for forcing the products of combustion through the water-heating coil and through the analysis apparatus.

Fig. 2 represents (on an enlarged scale) a sectional view showing the burner combustion chamber and water-heating coil and the water jackets pertaining thereto; also the water entrance and outlet, and the dispositions of the bulbs of the minimum and maximum thermometers in relation to the entrance and outlet.

Fig. 3 shows (also on an enlarged scale) the arrangement of the aneroids and the pen-staff mechanism which is actuated thereby.

The body of the instrument consists of a casing enclosing a cylindrical combustion chamber F, to which access is obtained by a tubular passage D, whose lower end is closed by a removable stopper E fixed to a pipe B that carries the burner A. The burner is mounted on the gas-pipe so as to come within the middle of the combustion chamber, and is supplied with a mixture of gas and air controlled "to keep the supply constant or regular," so as to ensure that the same weight of gas shall be delivered to the burner during every unit time that the instrument is in action. And to provide for the delivery of the gas with the appropriate quantity of air, a quantity-controller is connected on to an injector operated by air forced into it by a pump, fan, or the like at a few pounds pressure per square inch.

The resulting mixture of gas and air under pressure is ignited at the burner, while the latter is outside the instrument; and when it is in proper action, it is introduced into the combustion chamber by way of the open-bottomed shaft D, and secured in position by the stopper E on the supply pipe. The stopper also serves to close the bottom of the shaft and prevent the escape of any of the products of combustion therefrom.

The form of burner shown consists of a double cylindrical mantle or shroud C, made of refractory non-corrosive material—preferably silica. Combustion takes place within the mantle when the burner is ignited, before its introduction into the instrument; and the burner is placed in position before being passed up into the combustion chamber.

The combustion chamber F has only a single outlet consisting of a spiral or coil of relatively small bore tubing G, which serves as a water-heating element. Both combustion chamber and spiral are enclosed in a jacket or cylinder H, through which water is compelled to circulate at a constant rate. The water enters the lower part of the jacket from an elevated cup I, and is compelled to rise within the jacket or flow through it in the inverse direction to that in which the products of combustion from the chamber F are forced by the action of the gas and air supply pressure through the coil G. The result of this arrangement is that the water, in passing through the jacket at constant unit quantity in unit time, absorbs from the walls of the coil G and combustion chamber F the whole of the heat generated by the combustion of the known quantity of gas per time unit at the burner, so that the combustion products are discharged from the outlet of the coil at the temperature of the water as it enters the jacket. Thus the thermal value of the gas being tested is accurately arrived at by measuring the difference of temperature between the water where it enters the bottom of the jacket and at the upper part where the water leaves; while to examine the products of combustion, it is only necessary to couple the outlet end of the coil on to an ordinary gas analysis apparatus, as shown in fig. 1.

To automatically record the differences in temperature between the water at the points of intake and discharge, an arrangement is used that comprises two metal spherical or cylindrical vessels K^1 K^2, constituting thermometer bulbs, one of which (K^1) is contained within the cup I, where the cold water enters the instrument; so that it is maintained at, and measures, the minimum temperature of the water, while the other bulb is situated in the upper part of the water-jacket H, just above the combustion chamber, where it is influenced by the hot water leaving the instrument, and consequently measures the maximum temperature of the water. The two thermometer bulbs are connected to aneroids L L^1, mounted in the recording part of the instrument. The bulbs, connecting tubes, and aneroids are filled with oil or other liquid, the expansion and contraction of which, under the influence of temperature variations, result in a corresponding outward or inward movement of the aneroid faces. In order that these deflections may be mechanically recorded, a pair of levers are fulcrummed to small brackets on the frame of the mechanism, and the short arm of each lever contacts (by means of a small adjustable pin) so that one lever is influenced and oscillated by deflections of the aneroid L, caused by variations in the minimum water temperature, while the other is similarly influenced by the deflections of the aneroid L^1 under variations in the maximum water temperature. The two ends of the longer arms of the levers are coupled to one another by a bronze strip or thread R, whose extremities are fastened to the lever ends, while the middle part of the strip is made to take a complete turn round a roller or rock-shaft S (which carries a pen-staff) mounted in the forked end of a lever X having its fulcrum on a small fixed bracket. The other end of the lever is acted upon by a spring, whereby the connecting strip is maintained in tension, and the contact screws of the aneroid levers are kept bearing against the deflecting aneroid faces, so that they follow up the latter when they move inwardly in unison with any contraction of the liquid contents. The pen-staff, connected to, and turning in unison with, the rock-shaft, is furnished with a pen, whereby the movements of the mechanism are recorded on a band of paper carried upon a clock-driven drum.

With this arrangement, should both aneroids contract or expand to the same extent—as a consequence of a common change of temperature—no turning motion will be imparted to the rock-shaft and pen-staff, as both the aneroid levers will make an equal angular movement

in the same direction, and when the aneroids expand, the strip R will act simply as a link and impart a corresponding movement to the lever for tensioning the spring to obtain a return movement of the parts when the aneroids contract. If, however, the aneroids are influenced by different temperatures such as obtains when the calorimeter is in use, then their differential expansion causes the one aneroid lever to make an angular movement relatively to the other, and which movement is transmitted to the roller or rock-shaft by the tensioned strip R acting like a band upon a pulley. The turning over the roller produces a corresponding movement of the pen-staff, and alters the position of the marker upon the surface of the travelling paper.

Thus, when the instrument is in use, every movement produced at either of the aneroid faces by changes in their influencing temperatures results in a change in the position of the pen-staff, which vibrates in synchronizm only with variations in the difference between the temperature as measured by the minimum thermometer and the temperature as measured by the maximum thermometer, and these differential variations are marked by the pen, and are automatically recorded on the travelling paper, either as temperature or corresponding thermal value.

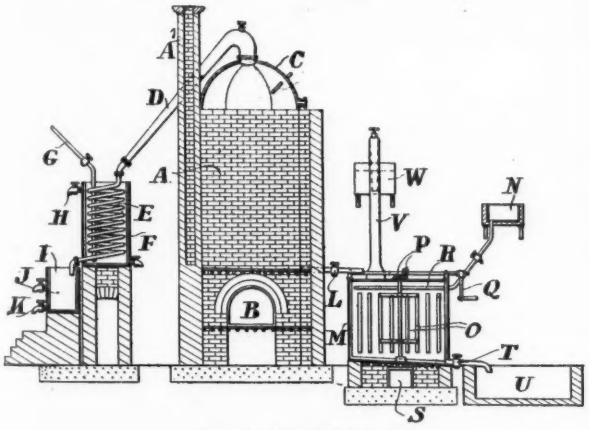
Solidifying Tar.

LEAVER, E. T., of Cannon Street, E.C.

No. 17,209; July 23, 1909.

This invention relates to the extracting of tar and treating it for use in the manufacture of briquettes and for other commercial purposes—for instance, in processes whereby the crude liquid tar is placed in a still, and (after the naphtha or other vapours have been allowed to pass off) the tar is led into a pan and stirred with the addition of sulphuric acid and finally run into moulds. The object of the invention is "to improve the mixing apparatus and facilitate the mixing operation."

The tar from the still is led into a mixing-tank, separate from the still and arranged at a lower level; the tank being also independently heated to a temperature of about 200° Fahr. It is provided with stirring devices operated by hand through bevel-gearing, as hitherto proposed for stirring tar in a still wherein the mixing with acid also occurred. The mixing-tank is practically closed in, so that any fumes arising may be led off and trapped; and it is further provided with a sprinkling pipe fed with sulphuric acid. The bottom of the tank is sloped to one side to facilitate discharge through a cock into a tank or moulds—the whole arrangement being such that the tar and acid are fed by gravity from one vessel to the next, so as to avoid the necessity for raising either the tar or the acid in its passage through the plant.



Leaver's Tar Solidifier.

The liquid tar is placed in a still in the structure A having a furnace B; the still being provided with the dome-like top C, which terminates in the goose-neck pipe D, the lower end of which is connected to the coil condenser E in the tank F, through which cold water is passed from the pipe G and is allowed to escape through the tap H. While the tar is heated, the naphtha light oils and water vapour pass off through the pipe D into the coil, and, condensing therein, run into the tank I, from which they may be drawn off by the taps J and K. After extraction, the tar is run off from the still through the pipe and valve L into the mixing-chamber M, where it is thoroughly mixed with sulphuric acid (flowing from the lead-lined tank N and through the sprinkling pipe R) by the mixing rods or agitators O, operated by bevel-wheels P and the handle Q. The mixing-chamber is arranged over furnace S; and when the mixture is sufficiently heated, it is drawn off through the valve and pipe T, into the tank U, which may (if required) contain moulds to receive the mixture.

The fumes arising from the mixing-chamber M are conveyed through the pipe V into the tank W; the outlet of the pipe being sealed in the tank by tar or water. As an alternative, the fumes may be conveyed from the pipe V into the furnace B or the chimney.

Treatment of Gases Produced by the Destructive Distillation of Coal.

HIBY, W., of Southampton Row, W.C.

No. 17,420; July 27, 1909.

In the course of his specification, the patentee says: A recently-suggested method of recovering ammonia from gases derived from the destructive distillation of coal consists in first removing the tar from the hot gases and then passing the gases, while still hot, through concentrated acid at such a temperature that the water vapour in them is not condensed in the acid. This method presents the advantage that the production of ammoniacal liquor is avoided. Nevertheless, there is always some effluent produced from the gases leaving the concentrated acid because these are cooled. In his experience, this effluent is objectionable and a source of trouble, since he finds it "offensive" or "poisonous." Another trouble in both gas and coke making plants is the deposit of naphthalene crystals from the gases during the cooling and the distribution of them. The difficulties arising from this are well known; and many attempts have been made to minimize them—such as washing the cooled gases by passing them through a suitable solvent for naphthalene.

According to the present invention, these troubles—due to the production of offensive or poisonous liquor and to condensation of naphthalene crystals in the cooling vessels and conduits—may be avoided if the temperature of the gases leaving the hot concentrated acid be maintained above a certain degree until, in the case of coke-ovens, these gases are burnt either in the oven flues, or elsewhere, or, in the case of gas making, until the formation of solid naphthalene during the subsequent cooling of the gases is prevented by treatment with the solvent.

The specific degree of temperature may be termed the "dew-point of naphthalene" in the gases under treatment. This dew-point is not the same for gases from all coke and gas-making plants, as it depends on many factors. In the case of gases which have been produced by distillation of washed and moist coal in coke-ovens, for instance, and subsequently scrubbed with tar and hot acid, the naphthalene dew-point is generally between 40° and 50° C. In the case of such gases, therefore, the temperature of the gases is to be maintained above 40° to 50° C. by any suitable means until the gases are burnt.

This overcomes the naphthalene trouble. But since the dew-point of water vapours in such cases is about 75° C., the temperature must be kept above this degree if the production of liquor is to be avoided entirely. Thus by covering the pipes with heat-insulating material, or otherwise preventing the cooling of the pipes, the gases can be consumed without the production of liquor or the deposition of naphthalene. Another advantage accrues from feeding the hot moist gas to the heating walls of coke-ovens—viz., the deposition of carbon, which brings about the choking up of such gas-conduits as are exposed to a red heat, is entirely prevented by the presence of the water vapours; the reaction being similar to the formation of water gas.

It is not always economical, however, to feed to the coke-ovens or other place where the gases are to be burnt so much water vapour as the gases contain at this temperature. Hence it may be found more advantageous to cool the gases to below the dew-point of the water vapour without allowing the temperature to fall below the dew-point of naphthalene—say, in the case in point, to 50° or 60° C. There is then obtained some effluent, which, however, only contains minute quantities of poisonous constituents, and is therefore less objectionable than that obtained when the gases are cooled as in former practice.

In the case of illuminating gas, this must ultimately have the temperature of the air. In the method according to this invention, a known expedient for preventing the separation of solid naphthalene from gases, and for collecting the naphthalene should the gases cool, is used. That is to say, before the gases are cooled below the dew-point of the naphthalene vapour in them, vapour of a solvent oil is introduced into the gases, which are then passed through a condenser, whereby the solvent oil and the naphthalene are condensed together. This condensate may be separated from aqueous liquor, simultaneously condensed, and returned to a still in which the required vapour of the solvent oil is being produced. In this way, the operation becomes continuous; and marketable naphthalene may be periodically withdrawn from the still.

Manufacturing Incandescent Gas-Mantles.

KREIDL, I., and HELLER, G., of Vienna.

No. 17,862; July 31, 1909.

This invention relates to the manufacture of gas-mantles of artificial silk. In the existing processes, the impregnating salts are converted on the fibre of the mantle into the corresponding hydrates by treating the salts—such as thorium nitrate, for instance—with ammonia. Now in this treatment not only the hydrate salts, but also alkali-salts (such as ammonium nitrate) are formed on the fibre; and these alkali-salts have to be completely eliminated, because their presence prevents the proper formation of a mantle. The present invention has for object to provide an improved process, in which the formation of the alkali-salts is prevented, and which consists substantially in the direct impregnation of the raw mantle fabric with thorium hydrate in the form of a colloidal solution of thorium hydrate ("sol").

The process is carried out by impregnating the raw mantles (preferably those made of artificial silk) with a solution of colloidal thorium hydrate ("sol"), to which there has been added the usual proportion—that is, about 1 per cent. of the amount of the thorium oxide—of cerium oxide in the form of a salt or of a colloid. This impregnation may be carried out according to any of the methods usually employed in the case of thorium nitrate solutions. After impregnation, the mantles are dried.

After drying, the mantle is subjected to an additional treatment having for object to impart a more coherent structure to the mantle after it has been incinerated. With this object, the "sol" on the fibre is converted into the "gel."* For this purpose, it is best to use ammonia as a coagulating agent—preferably in solution. As no salts are formed in this treatment, no subsequent washing of the mantle is necessary. After drying, the mantle is incinerated.

Whereas the treatment of the raw mantle with ammonia according to existing methods has for its object, the patentees remark, to convert the thorium salts into hydrates on the fibre itself, the treatment with

* According to Graham, "Philosophical Transactions" of the Royal Society, 1861, "the colloidal solutions, *per se*, are called 'sol,' and those colloidal bodies which have become insoluble by mechanical treatment, or the influence of heat, or under the action of chemical agents, are called 'gel.' See also 'Liebig's Annalen der Chemie,' 1862."

ammonia according to this invention is merely an additional treatment intended to coagulate the hydrate existing already on the fibre.

Mantles produced by the process are said to be extremely elastic and strong, and possess great illuminating power.

Vertical Gas-Retorts.

GIBBONS, W. P., and MASTERS, J. R., of Palace Chambers, Westminster, S.W.

No. 17,112; July 22, 1909.

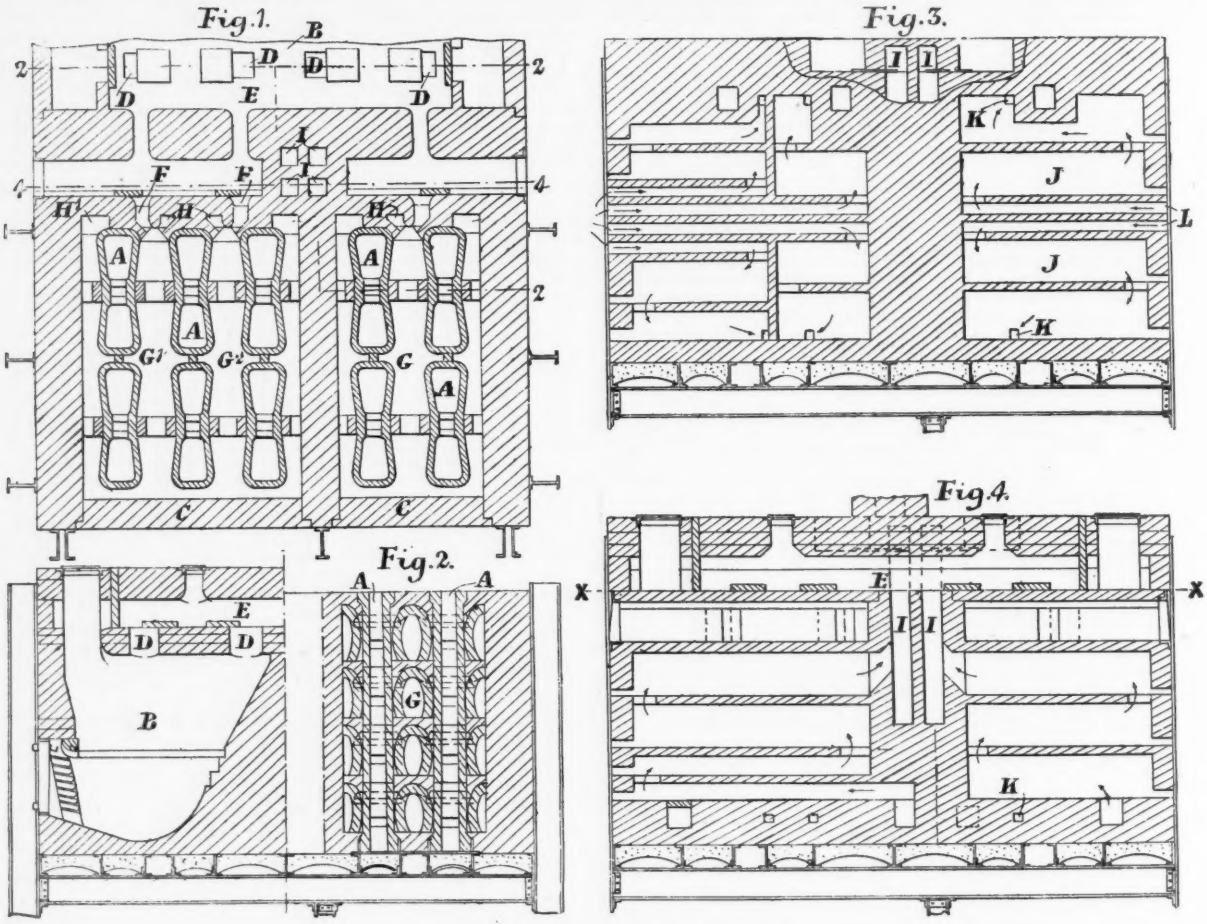
This invention relates to retorts of the vertical (or inclined) type, of the kind where the retorts of a setting are subdivided into groups and the heating and secondary air ducts are so arranged that one or more groups may be cut out and rendered accessible for repairs while the remainder in the setting continue in use. The regenerator is subdivided into sections corresponding in size with the capacity of the respective groups of retorts with which they are associated; the secondary air required in the heating of each group of retorts being pre-heated in a separate section of the regenerator, separately led to the combustion chamber of the corresponding group of retorts, and separately controlled by suitable dampers or valves.

The invention consists in arrangements according to which the producer for generating heating gases for the retorts is placed between the parallel rows of retorts and the heating gases are delivered to a central gas-duct extending between the two rows. Ports controlled by sliding dampers or other suitable valves connect, in the usual manner, this main gas-duct with the ducts leading to the combustion chambers of each group in which the heating gases mix with the secondary air supply and are burned.

In order to obviate the necessity of shutting down the whole setting of retorts for the purpose of repairing the producer or regenerator, the producer may be duplicated—the two producer furnaces being placed back to back, so that there will be a furnace always ready as a stand-by. Each producer is arranged to deliver the heating gases to the central flue; the communicating ports being controlled by dampers so that either furnace can be cut off as may be necessary.

Fig. 1 is a sectional plan view of one side of a duplicate setting of retorts in which the producer is interposed between the two halves of the setting. Fig. 2 is a vertical section on the line 2 of fig. 1. Fig. 3 is a longitudinal section through the regenerator showing the arrangement of secondary air flues. Fig. 4, above the line X, is a section on the line 2 of fig. 1, and below the line X is a section on line 4 4 of the same figure—showing the course of the waste-gas flues through the regenerator.

In fig. 1, each of the retorts A is shown as a double retort, the two members of which are placed back to back, as described in patent No. 16,925, of 1909 (see *ante*, p. 468); but the double retorts may be replaced by single ones of ordinary construction, and no claim is made



Gibbons and Masters' Vertical Gas-Retorts.

to double retorts *per se*. As shown, the double retorts are divided into two groups on each side of the producer B—one of six and the other of four. This arrangement is duplicated on the other side of the setting. In any case, the setting is so constructed that each group of retorts is accessible for repairs by the removal of an outer wall, or part of an independent outer wall (as C), of the setting.

Preferably (as shown) the producer is placed between the parallel rows of retorts, and is double; the two producer furnaces being placed back to back, and each being provided with ports D, which can be closed by dampers, so that either furnace can be cut off for purposes of repair without shutting down the whole setting. The heating gases from the producer pass to a central flue E, and thence, through ducts F controlled by dampers, to the combustion chambers G G^1 G^2 between adjacent retorts, where they mix with the secondary air supply—entering the chambers by the ducts H. Here they are burned; the burnt gases passing around the retorts and thence by the ducts through the regenerator, in which the secondary air supply is pre-heated, to the damper controlled waste-gas flues I.

The regenerator is divided into sections, according to the capacity of the respective groups of retorts with which they are associated; the secondary air required in the heating of each group of retorts being separately heated. Thus the secondary air delivered to the combustion chamber G is, in the arrangement shown in the drawings, heated in the sections J, passing thence, through the ducts K, to the upper and lower ends of the combustion chamber. Similarly, the heated air from other sections is led through ducts to the combustion chamber G^1, and that from still other sections through ducts to combustion chamber G^2. The various air inlets L to the regenerator are independently controlled by dampers or valves not shown.

Gas-Lighting Apparatus.

GAS-LATERNEN-FERNZÜNDUNG (SYSTEM DR. ROSTIN) G.M.B.H., of Berlin.

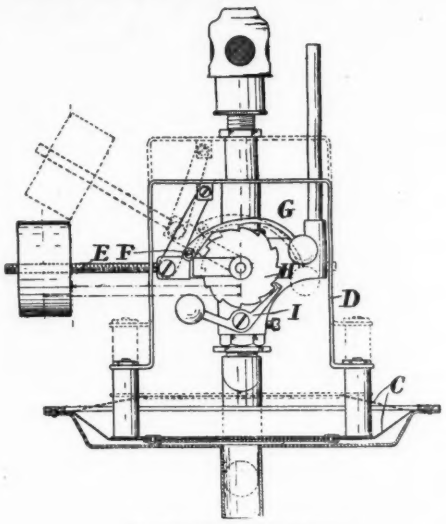
No. 25,081; Nov. 1, 1909. Date claimed under International Convention, Nov. 6, 1908.

This invention relates to apparatus for igniting and extinguishing gas-jets from a distance, of the type in which "the valve is operated by a predetermined maximum pressure in the gas supply pipe, and which will not again operate the valve until the pressure has been reduced to normal and raised again to the maximum." The use of steadying valves, as described in patent No. 7289 of 1904, increases the cost of the apparatus; and the object of the present invention is the construction of such apparatus without the use of these valves.

The apparatus is arranged with a swinging lever by which the ratchet wheel of the valve is rotated; and to the lever a weight is applied to determine the maximum pressure—the length of the lever and the weight applied to it being such that, when the lever swings upwards to rotate the ratchet wheel of the valve, a reduction of the effective leverage, and therefore of the opposing force, takes place.

A diaphragm C (which may be substituted by a bell or a piston)

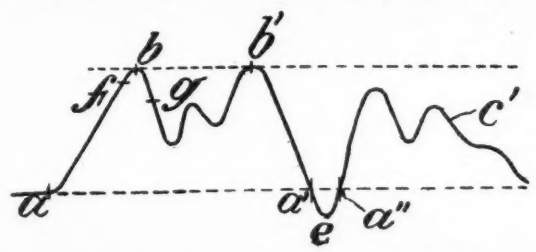
under the action of the gas imparts its motion by a yoke D to a lever E, which rotates round a pivot of the valve spigot. On the outer end of the lever a counter pressure weight is mounted—adjustable on a screw thread; and to this lever is pivoted at F a pawl G engaging in the teeth of a ratchet wheel H. A catch I prevents the ratchet wheel being rotated backwards unintentionally. The movements of the wheel are imparted to the spigot connected with it; so that the latter is alternately moved into its open and closed positions during the corresponding movements of the wheel H.



Rostin's Gas-Lamp Lighter.

The position of the individual parts of the device shown in full lines corresponds to the preparatory position for the next actuation of the valve. The position of the weight corresponds to the greatest operative leverage A; so that the counter load produced by it is equal to a definite gas pressure. If this pressure is exceeded, the lever arm E begins to rise until the weight has moved into the position shown in dotted lines, when the maximum pressure has been reached. The operative leverage of the weight has now diminished to the amount B. When it moves, the wheel H has been rotated one tooth by the pawl G, and has actuated the spigot, and consequently opened the passage of gas to the burner.

In order to prevent fluctuations of pressure between the amount g and the initial degree of pressure a from acting on the tap, the length of each of the teeth of the ratchet wheel must bear a definite ratio to the lift of the lever E. When the pressure has again fallen to normal—for example, a^1—then the nose of the pawl G will engage in the next tooth, without, however, actuating the ratchet wheel. The latter is consequently again in the working position. If the pressure sinks still further—for example, from a^1 to e—then the pawl will not move further backwards inasmuch as the stroke of the diaphragm or bell is limited.



Now if pressure again returns to the initial pressure a^{11}, then the parts of the apparatus will occupy the same position as at a^1. Now if the pressure again rises in the manner shown according to the curve c^1, then the ratchet wheel will not be rotated, as the weight with its greatest effective lever length of arm will prevent the lever lifting, and consequently rotating, the ratchet wheel. Only on again attaining a degree of pressure f will the pressure begin to overcome the counter-pressure; while only on reattaining the maximum pressure b will the lever be raised and the ratchet wheel rotated, and the gas-tap again actuated and the closing of the tap effected.

From this, it will be seen that a reopening or reclosing of the gas-tap after a previous opening or closing can be effected independently of all fluctuations in pressure, only after the gas pressure has first been reduced to the initial pressure and subsequently raised to the maximum pressure b, or to an amount f nearly equal to it.

Brighton and Hove Gas Company.—At the ordinary general meeting of the Company next Friday, the Directors will report that, compared with the results for the six months ended the 30th of June, 1909, the sale of gas in the past half year showed an increase of 5,556,900 cubic feet; while the sale of residuals produced £394 more. The half-year's profits, including £32 received for interest, amounted to £32,186, to which is added £12,958 brought forward; making a total of £45,144. After charging interest on the debenture stock, &c., and £2000 in respect of the cost of the new Act, a sum of £40,425 is available for distribution; and the Directors recommend the declaration of dividends for the half year at the statutory rates of 6, 4, 11, and 8 per cent. per annum on the several classes of consolidated stock. The payment of these will require £23,653, and leave £16,772 to be carried forward.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Free Wiring and Fittings' Sales by Electrical Undertakings.

Sir,—May I draw the attention of your readers, and especially of those interested in the gas industry, to the extraordinary activity now being shown by the Incorporated Municipal Electrical Association, in trying to persuade all corporations who own electrical undertakings, to support them in again introducing a Bill in Parliament that will allow them to undertake free wiring and the sale of electrical lamps and fittings. Through the energy displayed, and the work done by the Electrical Contractors' Association and the Ironmongers' Federated Association, we were able to prevent this being embodied in the Electric Lighting Acts (Amendment) Bill of last year.

I am writing to point out how serious will be the position of private gas companies, and the gas industry generally, if the object is attained for which these municipal traders are working. Donations in support of a scheme whereby municipalities might do all the work themselves are being asked by municipal associations all over the country.

I have addressed a letter to Mr. J. W. Helps, the Past-President of the Institution of Gas Engineers, pointing out to him that the two Societies named—the Electrical Contractors' Association and our own—received no support from the gas industry in the parliamentary work we did last year.

Gas companies and private consumers are, at the present moment, compelled to pay rates—so supporting electrical undertakings, many of which are not paying their way. In this city, the Electrical Committee voted some £25 to support the Leicester Corporation in fighting a case against private traders. The Corporation, in general meeting assembled, struck out this item, and fortunately would not allow the rates to be used for business of this description. This, however, has not been the rule over the country, and sums of money have been promised and collected out of the rates, and will be used practically to fight an industry that your readers support.

We shall have a big fight in Parliament over the new Bill that is to be introduced; and surely, before it is too late, the gas industry should support those who did such good work last year in opposing this municipal trading, the object of which is to bolster up a particular industry out of the ratepayers' pocket.

R. H. Smith, F.R.G.S., F.C.S.,
General Secretary of the Ironmongers' Federated Association.

Apsley House, Sheffield, Aug. 12, 1910.

LEGAL INTELLIGENCE.

Position of the St. David's Water and Gas Company.

Last Wednesday, Mr. Morrison applied to the Vacation Judge (Sir Samuel Evans), on behalf of Mr. Painar, a debenture-holder in the above-named Company, for the appointment of a Receiver and Manager, on the ground that several creditors were threatening to take proceedings for the recovery of the amounts owing to them, and that the Company could not obtain credit for coal to enable them to carry on the business. The Company did not object to the appointment. His Lordship said he had no power to appoint a manager in the case of a statutory company. Mr. Morrison said he understood Mr. Justice Joyce had made such an order in a similar case. His Lordship inquired what was the amount of the debenture. Mr. Morrison said it was £50, and the interest was a year in arrear. Counsel for the Company said he was not in a position to oppose the appointment of a Receiver, and if a Manager could be appointed it would be as well, as otherwise the consumers in the district would be deprived of their supply of gas. Creditors were prepared to give further credit if there was someone in control in whom they had confidence. His Lordship: If the Company cannot get further money, how can a Receiver get it? Mr. Morrison: He could collect the rents. His Lordship asked whether the Secretary had made an affidavit; and on being informed that he had not done so, he said he could not make the order. The application might be renewed on a future occasion.

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[777] **Bucks and Oxon Gas Company.**—Messrs. Corbould-Ellis and Mitchell have presented a petition for the compulsory winding-up of the Bucks and Oxon Gas Company, and it will be heard before Mr. Justice Neville on the 18th of October. The "London Gazette" contains formal notice that any creditor or contributory of the Company desirous to support or oppose the making of an order on the petition may appear at the time of hearing, by himself or his counsel, for that purpose if he intimates his intention to do so not later than 6 p.m. on Oct. 17.

Increased Gas Supply at Taunton.—In the report presented at the annual meeting of the Taunton Gas Company last Tuesday, the Directors stated that the total quantity of gas sent out during the twelve months ended the 30th of June had been 109,164,800 cubic feet. The amount of profit available for distribution was £7568, out of which the Directors recommended dividends at the rates of 5 per cent. on the preference stock, 9 per cent. on the consolidated "A" stock, and 7⅞ per cent. on the "yellow" shares and on £12,920 of new ordinary stock, absorbing £4174. The Chairman (Mr. J. Barrett), in proposing the adoption of the report and accounts, said that the Company had been on the progressive grade for a great many years; and in the past year there was an increase of 3,372,800 cubic feet in the quantity of gas sent out, while it had been of extremely high quality. The report was adopted. Among the votes of thanks was one to the Secretary and Manager (Mr. A. J. Edwards) and the members of his staff, for the zeal and efficiency they had shown in connection with the Company's business. At a special meeting, the Directors were authorized to issue new ordinary 7 per cent. stock to an amount not exceeding £5000.

MISCELLANEOUS NEWS.

LIVERPOOL UNITED GAS COMPANY.

Retirement of the Secretary and Treasurer—Reduction in Price.

The Half-Yearly General Meeting of this Company was held last Tuesday—Mr. H. WADE DEACON in the chair.

The report and accounts for the year ended the 30th of June showed that the sale of gas produced a revenue of £521,681; the rental of meters and stoves came to £16,549; residuals yielded £98,806; and the total receipts were £637,637. The expenditure on the manufacture of gas was £388,856 (coal and oil costing £273,256, and repair and maintenance of works and plant £64,215); on distribution, £54,426; on management, £21,632; the contributions to the officials' superannuation fund and the Company's moiety to the superannuation of old officials came to £5205; and the total expenses were £508,327. The balance of £129,300 was carried to the profit and loss account. After deducting the amount taken for the dividend declared in February and interest on the debenture stock, there remained a balance of £71,323, out of which the Directors recommended the payment of a dividend for the half year of 5 per cent. on the consolidated "A" stock, and 3½ per cent. on the 7 per cent. "B" stock.

The CHAIRMAN, in moving the adoption of the report, said that, in accordance with a resolution passed at a special meeting in February, the Company, along with other gas companies, promoted a Bill for the introduction of a standard burner for the testing of gas. The Bill had passed through the House of Lords and through the Committee of the House of Commons, and was now awaiting the third reading in that House, which they hoped it would receive in due course. He had considerable pleasure in reporting that the accounts showed the past year to have been a very satisfactory one; for they had had an increase of about 1¼ per cent. in the consumption of gas. The capital expenditure had gone up by £7557, partly owing to the new oil reservoir at Garston [see *ante*, p. 463], and partly owing to meters. The expenditure on the manufacture of gas amounted to £388,856—a decrease of £9502 as compared with last year. The decrease was chiefly in coal (£9983); and there was a drop of £3866 in wages, which was most satisfactory as showing the economical working resulting from better apparatus. But there was an increase of £4000 in repairs and maintenance. The distribution of gas cost £54,426, a decrease of £2000; public lamps showed an increase of £150; rent and taxes were £667 more; there was a small increase in management expenses of £300; and law and parliamentary expenses were increased by £800, due largely to promoting the Bill referred to, and partly owing to expenses connected with the arbitration with the Corporation. The superannuation funds and moities had increased by about £300. The total expenditure of the year was £508,327, compared with £508,000 odd for 1908-9. The receipts from the sale of gas amounted to £521,681—an increase of £7303, which was extremely satisfactory. He was glad that the increase concerned all classes—private tenants, users of automatic meters, and public lighting. Meters and stoves showed an increase of £529; but coke had done badly, as the receipts—£55,542—were £4271 down. The price of coke had not been satisfactory; and the Company had had to suffer in common with other gas undertakings. Tar had done better for them; the receipts (£22,304) showing an increase of £2867. Ammonia had not done so well; the receipts (£20,959) being £1645 less than before. The total receipts were £637,637. Deducting from this amount the total expenditure of £508,327, there was left a balance of £129,310, which was placed to the credit of the profit and loss account. After deducting the interest on the two half-yearly dividends, there was a balance of £71,323 to carry forward. From this fell to be deducted the half-yearly dividend now to be paid; and assuming that the dividend recommended would be passed, there would be a balance of £18,140. The Directors proposed to reduce the price of gas to ordinary consumers by 1d. per 1000 cubic feet, as from the 1st of July last, and to prepayment meter users by 2d. per 1000 cubic feet, which would come into operation by the beginning of next month. These reductions would amount to something like £19,000; but this sum represented money which had accumulated. He hoped the reductions would prove satisfactory to those who used gas. The endeavour of the Directors had always been to do everything in their power to cheapen the cost of production, and so reduce the prices at which they could afford to sell gas. He had now two important announcements to make. The Board had received a communication from the Secretary, Mr. P. F. Garnett, resigning his position. He had also to announce the resignation of the Treasurer, Mr. John Frederick Robinson, who had been with them for 37 years. Mr. Robinson had seen great changes in the constitution and in the working of the Company. He had taken the keenest interest in the work; and, on behalf of the Board, he (the Chairman) desired to express sincere regret at losing him.

Alderman JAMES LISTER seconded the motion, and it was carried.

BOURNEMOUTH GAS AND WATER COMPANY.

Increased Output—The Standard Burner Bills.

The Ordinary General Meeting of this Company was held on Friday, at the London offices—Mr. G. CRISPE WHITELEY presiding.

The half-yearly report and accounts were taken as read.

The CHAIRMAN, in moving their adoption, said he had less than usual to say on this occasion. The Company had had a most successful half year, and he doubted whether he, or his predecessors in the chair, had been able to put a happier state of affairs before the shareholders. There had been an increase in the output of gas of 4·56 per cent.; while there was an increase of nearly £1000 on the water-rental. Residuals had gone up by £2000. The Company had, moreover, been able to get cheap oil and coal, with the consequence that everything had gone well. Under the circumstances, there was very little for him to do but to congratulate their Engineer and General Manager (Mr. Harold W. Woodall) upon the result of the half-year's work. He congratulated Mr. Woodall, both in his capacity as their Engineer and as representative of the staff. As to the future, he (the Chairman) thought that those who held gas shares and were interested in gas-works could look forward calmly to what was in store for them. It might be that they would have to pay more money for coal. But, on the other hand, they would probably have to give less for oil; and even the higher price of coal would to some extent be compensated by an increased price for their residuals. Electricity would not, of course, stand still. But neither would they; and they must leave it to their Engineer to meet the lessened price of electricity by reducing the price for gas. The Company had held their own in the past and at present; and there was no reason why they should not hold their own in the future. But the proverbial rainy day might arrive; and the Directors were providing against this by strengthening their undertaking. They had completed the purchase of their freehold stations at Longham and Alderney. During the last few years, their General Manager had properly called upon them to expend considerable sums for the improvement of the business; and they had used a portion of their reserve for this purpose. During the past six months, however, there had been a lull in this expenditure; and the Directors had been able to increase the amount of the reserve put into outside securities. They had invested £20,000 of the reserve, £15,000 of which had been lent to the Bournemouth Corporation. This should strengthen the tie between the Corporation and the Company. The Company's offices at Poole Hill were now insufficient to cope with the increased work. The Directors were therefore going to make a reasonable expenditure in remodelling, enlarging, and beautifying them. Their co-partnership scheme had turned out a complete success. Although it had only been going on for two years, they had now 393 members, practically all who were qualified to join. The Company had given in bonuses during the past two years £3500; and, what was better, the workers themselves had invested £700 of their own money with the Company, which showed how the scheme was encouraging thrift. There were 83 shares in the Company held by workers, and 43 workers were shareholders. Referring to the Gas Companies (Standard Burner) Bills, now before Parliament, the Chairman explained that the Company had been working for many years with an obsolete standard burner, and, together with other companies, they thought it was time to secure modern apparatus. This would benefit the Company and do no harm to the consumers. For reasons he was unable to fathom, the Bill had been contested at every point in its passage through Parliament; but it had now passed the Committee stage of both Houses, and only awaited the final reading. The Directors hoped that the time and money spent over this matter would not be wasted, and that the Bill would ultimately become law. Although the Bournemouth Corporation had opposed them, they were not going to allow this to affect the good relationship still existing between the two bodies, as the dispute was in the nature of a "lovers' quarrel." Whether the Bill passed or not, the Company had gained an advantage in the clear and interesting evidence given on their behalf before the House of Commons Committee by their colleague Mr. Cash, whom he called upon to make a short statement on the matter to the meeting.

Mr. WILLIAM CASH, in seconding the motion for the adoption of the report and balance-sheet, said they had more than one object in view in asking for the standard burner. He believed that the adoption of such a burner would be an advantage to consumers and likewise to the Company. Then there was the question of uniformity of test. The burner had been adopted by many other companies and local authorities, and it was approved by the London Gas Referees, who had the power to prescribe the kind of burner which should be used for the testing of gas in the London area. The Corporation of Bournemouth opposed the application by the Company, not in any spirit of hostility, but to secure what they believed to be the interests of the ratepayers. The burner would be an advantage in this way. The Company were compelled to give 15½ candle power light, and with the present burner they had now to give a slightly higher power in order not to fall below the standard. The new burner would enable them to get the true illuminating value. Consumers need have no fear but that they would get the best value commercially possible, because it was to the interest of the Company to give it to them in view of the great competition they had to face. They had not only to meet the competition of electricity, but gas had a rival light in acetylene; and for power purposes, in oil and steam engines. It was therefore essential that the Company should supply a suitable article. Not only had they done so, but they had very much decreased the price of gas from year to year. The figures as to this were striking. Their price in December, 1897, was 3s. 6d. per 1000 feet, which was reduced in 1898 to 3s. 4d., and in 1901 to 3s. 2d. In 1903, the price was brought down to 3s.; in 1908, it had got as low as 2s. 9d.; and from Ladyday this year, it had been 2s. 7d. When the Company took over the Poole gas undertaking in 1902, the price in the district was 4s. 4d.; now it was 2s. 11d.—a reduction of 1s. 5d. in a short period of 7½ years. He also asked the shareholders to remember that, though they made these reductions, the Company had never taken out of the business the full money they might have done for division among of the shareholders—in fact, they could have paid much larger dividends than they had done. As to the co-partnership scheme, this was bound up with the question of gas. The interests of both the co-partners and the Company were identical; and this was another inducement to the Company to sell gas at the lowest price possible. As a matter of fact, the shareholders in the Company had not received a large return for their money, because the dividends and interest paid worked out at 5¼ per cent. on the total sum put into the undertaking. He hoped the Bill for a standard burner would become law, and give the Company the advantages they hoped for from it.

The motion for the adoption of the report was unanimously adopted, and was followed by a vote of thanks to the staff.

Mr. HAROLD WOODALL, in responding, said that in the ten years he had been at Bournemouth the output of gas had increased 127 per cent. The staff were glad to know that they had the confidence of the Directors, and would continue to do their best for the success of the business.

Mr. H. A. PLUMB (the Secretary) also returned thanks; and the meeting terminated with the usual compliment to the Chairman.

"TELPHERAGE."

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ONE TON CAPACITY ELECTRIC TELPHERS HANDLING HOT COKE,
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For the RAPID handling of COKE, COAL, and other material.

LOW RUNNING COST.

MAINTENANCE REDUCED to a MINIMUM.

Specially suitable for dealing with Hot Coke direct from Gas Retorts.

OUR SYSTEM ADOPTED BY MANY LEADING GAS-WORKS.

USE OUR NEW EXTRA QUALITY

"GLASMI" MANTLES

during

LIGHTING SEASON, 1910-11

and

See decrease in cost of Maintenance.

We are satisfied that there is not a better mantle made, and having built up a reputation for quality we are determined to maintain same.

Specially Recommended for Street Lighting.

May we send you Samples to test to convince you?

Standard Quality "C"	**47s.** gross.	7581. XX Quality Inverted	**66s.** gross.
Extra Quality	**50s.** ,,	9619. Special Graetzin Fitting XX	**66s.** ,,
XXX....	**70s.** ,,	12418. XXX Triplex Inverted	**84s.** ,,

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Low Capital, Low Prices, and Large Dividends—Apotheosis of the Horizontal Retort.

The Half-Yearly Ordinary General Meeting of this Company was held last Tuesday, at the Offices, Fairfield Street, Wandsworth—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. Chas. W. Braine) read the notice of meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said there was one matter in the former to which he must first make reference. The Directors had lost their esteemed colleague, Mr. Edwin Ransome, who had given service to the Company as a member of the Board for forty years. He was one of the most consistent, painstaking, and broadminded of Directors. He came on to the Board at an important epoch in the Company's history, just when it had emerged from the Court of Chancery. A section who had revolted (and this extended even to the Directors) succeeded in landing the Company in the Court of Chancery. Mr. Thomas Symonds Howell, the son of the first Chairman and founder of the Company, was then the Chairman. He looked about him to find a Board to carry on the business; and he found two Directors in the persons of Mr. Edwin Ransome and Mr. Robert Jones. Had Mr. Howell searched London through, he could not have found two gentlemen who would have given more devoted or valuable service. Mr. Ransome had taken care of the finances and their audit. The difficulty that they had through the defalcations of a former Secretary would be remembered. Since then there had been very great care exercised over the audit; and there had also been a Directors' audit. Mr. Ransome devoted himself so thoroughly to the revision of the accounts of the Company, that in him they had an exceptional and quite abnormal colleague. He was a genial colleague—very determined, and very firm; but at the same time he was unpretending and modest. They all regretted, and mourned for him.

Turning to the accounts, the Chairman said he thought that probably never in the history of the Company had they more reason to congratulate themselves than on this occasion. He might fairly say it was a record that the Company had supplied gas at such a low price, and yet had such a favourable report to present. The report informed them that the Directors recommended dividends at the rates of £8 5s. per cent. per annum on the "A" stock, £6 15s. on the "B" stock, and £5 15s. 6d. on the "C" ordinary stock. These dividends, so far as they referred to the original stocks, were very large indeed, because the capital was added to on conversion. He was not ashamed to call attention to the fact that they were very large, and never should he be while he could show the world they were supplying gas at a low price. The dividends appeared much larger than in reality they were, because the sum of the "A" stock was small; and, on the report such as they had here, the dividend worked out to less than 5½d. per 1000 cubic feet. This circumstance was derived from the fact that, though they paid handsome dividends, the capital was extraordinarily small. It was only small through the engineering "foundation-stone" laid by Mr. Robert Jones, and supported by Mr. Thomas Howell and Mr. Ransome in the early days of the Company, and perpetuated afterwards by Mr. H. S. Freeman, their late Engineer (who was one of the most valuable Directors the Company could have), and now to some extent by their present Engineer (Mr. H. O. Carr). These dividends and the low price of gas proved the value of good engineering—not merely gas management—in the administration of a company. The dividends, handsome as they were, and small as the profit was which was necessary to pay them through the low capital, were not arrived at by the starvation of the works. There was one factor in the accounts that would go home to anyone who understood gas accounts, and that was that the charge for the upkeep of the undertaking was not less than 9·4d. per 1000 cubic feet. Large profits and high dividends that were arrived at without due attention to this important consideration were of little value. Before dismissing the working, he should like to say that the details of it—the gas made per ton of coal carbonized, the coke returns per ton, the ammonia, the tar, and, in fact, all the residuals, and the wages spent on carbonization—were all creditable to the administration and to the Engineer. He did not, however, think they were at their best, because during the half year they had been engaged in installing some new plant.

They had, in consequence, been working off some of the old machines which were the invention of Mr. Freeman, and which had produced a great deal of profit in their time, because, for a great number of years, the Company had been carbonizing by machinery, and they commenced doing so when such machinery was not well known to the gas undertakings generally in the kingdom. Good and serviceable as these machines had been, they were not now comprehensive enough for the work required in connection with the extensions they had been recently making; and one of the advantages from the changes they had effected would be that they would get better returns from their retorts than they had had before. Not only in connection with this Company, but generally, the period might be described as that of the apotheosis of the old horizontal retort, which many people for years past had been decrying, and had been endeavouring to improve upon by setting their retorts at angles and perpendicularly. But never, in his long experience of fifty years, had he seen such splendid returns and low carbonizing costs as were being produced from horizontal retorts at the present day by a number of gas undertakings in the kingdom, and especially those in the Metropolis, which he hoped would continue to keep the lead in this respect in the country at large. They would have the benefit of this at their own works through their new extensions, which comprehended a system by which the retorts could be fully charged, and the spent charges expelled by a pusher. If they obtained the results to which they were looking forward, it was possible the present low price of gas to ordinary consumers—1s. 10d. per 1000 cubic feet—might even again be reduced, and the dividend be further increased. Neither the Board nor their Engineer saw any particular virtue in the 1s. 10d. Though it might attract the admiration of some of their friends, and the envy of others, it was not in this spirit that they worked for the low price. They simply went on in the hope of getting the lowest price and the highest dividend by adopting processes economical in working, and so realizing what was of capital importance—that was the meeting of the demand of the present day for gas for fuel purposes. Gas must be so cheap now that people would burn it in preference to any other fuel. It was the ideal fuel; and the means of delivery and use occasioned no labour to the user, either in the home or in the factory, and, moreover, it made no smoke. In spite of the 1d. reduction in price (which last half year represented £2280 to the consumers), they had actually made an increase in the revenue of £157; and this in a half year when the increase in consumption was only equal to ½ per cent. This proved they could not always force the consumption by reducing the price; but it was right to reduce it, because, if it did not bear immediate fruit, it would do so in the near future. The secret of success were the economies of their working, which went on in spite of the 9½d. spent on upkeep, and which made their expenditure £2734 less, the larger part of which, of course, was represented by coals and oil.

The number of consumers had been increased by 290; more stoves had been fixed to the number of 270; and they had 224 more coin meters and fittings connected. This brought him to a point that had struck him very much—that was, the growing necessity of capital for the purpose of putting meters, fittings, and stoves into consumers' houses. It was business they would not have obtained without providing this capital. But it was not very remunerative capital, except by the sale of gas; for the rental from meters, stoves, fittings, and so on amounted in the half year to £10,400. But on the other side of the account, the upkeep of meters, stoves, coin meters and fittings, incandescent burners, and so forth, practically amounted to £9400; and this though the capital represented by all these things could not amount to much less than £150,000. In other words, the whole of the income disappeared in the upkeep of them. But what of that, if they could not get this business without supplying these things? And they did by these means enhance the sale of gas for day purposes compared with night purposes, which made the business in the long run profitable to the Company. He had some figures that had been got out in connection with their quinquennial rating; and they showed how large was the expenditure of capital nowadays for this sort of thing, as compared with works, in which (as he had said) they had been especially economical. They found that, in the past five years, they had had to spend no less than £32,500 upon meters, stoves, and fittings, as against £9361 for such things as works, mains, and service-pipes. This showed that the new business was demanding four times as much capital as the ordinary extension of the works. The figures were striking; and indicated the trend of their business.

It would be seen that the Board had filled the position held by Mr. Ransome by the election of Mr. Frank Harding Jones. He (the Chairman) was never more gratified than he was when informed by the Deputy-Chairman and Mr. Freeman that their views and those of their colleagues—Colonel Jones and Mr. J. B. Howell—were that the vacancy should be filled by a technically qualified Director, and that, looking at his (the Chairman's) advancing age, it would be as well to provide for the continuance of the policy which had been such a fortunate one for the Company. It was indeed gratifying to him that the selection by his fellow-Directors should have fallen upon his own son. He might say that, in addition to his technical training, Mr. Frank Jones was a Director of certain other companies with low prices and low capitals; and having been Auditor of this Company, he was specially acquainted with the business and figures. Quite apart from his professional interest, he was sure the historical association of the family with the Company would ensure that the new Director would give of his very best to the furtherance of their affairs. Regarding the vacant Auditorship, the Board felt that they could not do better than obtain the services of Mr. Ernest Burton, who was a competent accountant and had been for many years secretary of important gas undertakings, and knew the whole business from top to bottom.

They had now adopted a profit-sharing system among their workmen, who had taken it up in an enthusiastic spirit. The Deputy-Chairman was the Chairman of the Committee who had the matter in hand. He was glad to say they were able to begin with 6½ per cent. bonus on the wages, owing to the price of gas having been reduced just before it started. About 200 of the men had entered into the scheme; and he did not think there was more than a single case of any hesitation to take up the matter. He was sure it would in their own case, as it had done in other companies, operate to the benefit of the whole undertaking. In another direction they had not been idle. A large and important property—M'Murray's wharf and dock—which adjoined their works, came into the market a few months ago. It was a dock lying between the River Wandle and the Company's own gas-works' boundary. The Directors had bought this; and it had made their position almost unrivalled. They had now a river frontage and territory for future development which was, practically speaking, not enjoyed by any other gas company of which he knew. The Company's steamers ran direct with coal from Newcastle to opposite the works, and were unloaded between the works and Hurlingham polo ground; and the dock would give them further facilities. The property was purchased on excellent terms. It was going to almost immediately pay them 4 per cent. on the outlay; and, apart from this, it would add very much to the convenience and improvement of the whole works. In his concluding remarks, the Chairman mentioned that he came to serve the Company as Manager when he was only 17 years of age; and as he was now 67 years of age, he had had a tolerably long connection with the concern.

The DEPUTY-CHAIRMAN (Mr. T. A. Ives Howell) seconded the motion.

Mr. ERNEST L. BURTON congratulated the Directors and the officers on the accounts. He noticed that the residuals had returned 73 per cent. of the cost of coal, oil, coke, and water, and carbonizing wages. It was the best figure he had come across so far as he could charge his memory; and it reflected the greatest credit on the Chairman, Directors, and executive officers. He also congratulated the proprietors generally on the appointment of Mr. Frank Jones as a Director. As to co-partnership, it was the right thing to do; and he had every sympathy with it.

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY

CHAIRMAN, the dividends mentioned in the opening address of the former were unanimously agreed to.

Moved by Mr. DUKE, and seconded by Mr. JOHN HENNELL, Mr. Burton was unanimously appointed Auditor.

Mr. BURTON, having acknowledged his election,

A vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN, having responded, moved a vote of thanks to the Engineer and the Secretary, their staffs, and the employees generally. In doing so, he took the opportunity of mentioning that the Company withdrew from participation in the promotion of the Standard Burner Bills, seeing that they were threatened with strong opposition from the Borough Council (with whom they were on excellent terms) and the London County Council, who would very much like to get an oar in the Company's boat. He learned that the County Council had been testing their gas with the wheelbarrow photometer; and the return was 13·97 candles—only a small fraction below their standard. As this result was obtained behind the Company's back, under crude conditions, and round the corner as it were, he thought it very flattering to the Company and their Engineer.

Mr. FREEMAN seconded the motion, which was cordially passed.

Both Mr. BRAINE and Mr. CARR responded; and the proceedings terminated.

CROYDON GAS COMPANY.

Consumption—Gas-Fires—Standard Burner Bill—Co-Partnership.

The Half-Yearly General Meeting of the Company was held last Friday, at the Offices, Katherine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. W. Topley) read the notice of meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said it would have been noticed that there had been a slight diminution in the sale of gas in the half year. This, in great measure, must be attributed to the very mild winter that was experienced. But he was sure it would be gratifying to the proprietors to know that, since the end of the half year, the consumption of gas exhibited an 8¼ per cent. increase; so that, it would be seen, they were still able to hold their own, and show a satisfactory increase when the weather was anything like favourable. There had been a steady, quiet growth both in the number of consumers, and in that of stoves on hire. The former had increased by 636, to a total of 36,280; the latter by 561, to a total of 24,882. When considering the number of stoves on hire as an indication of the increasing extent to which gas was being used for heating and cooking, it must not be overlooked that a large number of consumers elected to own the fires they used. Some bought them outright at low cash prices, others by easy instalments, and very frequently consumers, after hiring a stove, and thus satisfying themselves as to its convenience and utility, took advantage of the favourable terms the Company offered, and purchased at a price in fixing which the rents they had paid were taken into account. The Company had sold to consumers in these ways over 1300 stoves in the last three years. No doubt also a good many stoves had been bought by consumers direct from the makers, or through tradesmen. Of these, the Company had no record. It was gratifying to note that the appreciation shown by consumers of the Company's offer to give free attention to incandescent burners continued to be a steadily growing one. As he had before said, the cost to the Company of giving this free attention to consumers' burners was considerable; but the increased efficiency which the consumer was able to obtain from the gas used, made the value of this service to him far greater than was its cost to the Company.

It would have been seen from the report that the Standard Burner Bill, the promotion of which was approved by the proprietors at the meeting in February last, had not yet actually passed into law, though the Directors had grounds for confidently expecting that it would do so before the end of the year. Both in the House of Lords and in the House of Commons, it was strenuously opposed before Committees by certain local authorities, who apparently failed to realize how completely the interests of gas companies and their customers were identified nowadays. He was pleased to be able to tell the proprietors that the local authorities in the Company's area did not take part in this attempt to prevent gas companies securing a standard which would assist them in adopting those methods of manufacture which the progress of gas engineering in recent years was showing to be best adapted for enabling gas undertakings to give to their consumers the gas best suited to their requirements at the lowest possible price. The case for the adoption of a fair and uniform method of testing had been so fully substantiated during the full and costly examination of the question by both Committees that it was hardly likely to be fought again. It was too early yet to say what might be the exact results of the adoption in the district of the new burner for gas testing, when its use was sanctioned by Parliament. This much he could, however, say: That while care would be taken to see that the consumers got in the future a gas certainly not less suited to their requirements than that now supplied, the freedom to adapt manufacturing methods to modern requirements would be of material assistance to the Directors in their efforts to reduce the price at which gas was sold. The proprietors would all, he was sure, share the satisfaction with which the consumers would receive the announcement that the Directors had seen their way, without waiting for the passing of the Bill, to make 1d. reduction in the price of gas after the end of the quarter. This was a very considerable gain to users of gas; it would represent above £5000 a year to the Company. Put in another way, it was about the same thing, so far as their pockets were concerned, as a penny reduction in local rates. This should, and he was sure would, be satisfactory to everyone concerned. The Directors were hopeful, if circumstances continued favourable, to follow this reduction by another in the not distant future.

In the report mention was made of a very pleasant function which took place at the works in June, when the Directors had the pleasure of receiving a visit from the members of the Institution of Gas Engineers, of which body Mr. Helps, the Company's esteemed Engineer and General Manager, was President last year. The large attendance—he (the Chairman) believed that it was a record one—at the excursion to Croydon was a testimony (which would be as pleasing to the proprietors as it was to the Directors) to Mr. Helps's popularity in the profession of which he is one of the foremost members, and to the reputation of the works he had designed and controlled. The Company regarded it as an honour also that, when early in October a representative gathering of German Gas Engineers would be visiting England, at the invitation of their English colleagues, the works at Waddon would be one of the few selected for inspection by the Council of the Institution as typical of the best and most up-to-date in English gas-works design.

He need but briefly refer to the figures in the half-year's accounts. There had been a considerable reduction in the cost of coal and oil, both of which had been obtained at lower prices than a year ago. On the other side of the account, residuals had given very good results all round. The use of tar for road treatment still increased, and appeared likely to continue to do so. Sulphate of ammonia had realized an improved price. They might hope for good results regarding this residual from the active steps which were being taken by the Sulphate of Ammonia Committee to make farmers in this country better acquainted with its great value as a fertilizer. A small subscription, based on their annual make, was paid to the Committee by this and many other companies; and the money was expended by them in popularizing the use of sulphate, and finding fresh outlets for its sale. Recently a valuable and instructive conference was held at the offices of the Gaslight and Coke Company, when delegates from the United States, Germany, and Belgium attended, and described the propaganda work carried on in these countries. It was to be hoped that the value of this work might be more widely realized in this country; and that the companies who did not now support the Committee would see their way to join in a work from which they, in common with others, would benefit.

The question of joint advertising by gas companies, not only in regard to residuals, but to extend the use of their primary product, gas, had been receiving a great deal of attention lately. Tentative suggestions in this direction were put forward by Mr. Helps in his presidential address this year to the assembled gas engineers. Several gas companies had intimated their willingness to subscribe to a central fund for the purpose; and the proprietors, he was certain, would concur in the approval the Directors had expressed of the project. Large sums were already being spent in this way by a few of the larger companies, notably the Gaslight and Coke Company, who were now to be found in the front in all matters concerned with the welfare of the industry. But general advertising of the advantages of gas on anything like an adequate scale entailed too large a burden to be borne on the shoulders of one or two undertakings, broad though the shoulders might be; and it could hardly be gainsaid that an expenditure from which all gas companies would benefit alike could, and should, be shared by all.

The items in the revenue account other than those to which he had referred called for no special comment. Expenditure under the heading of "general charges" was higher than usual, owing partly to exhibitions of gas appliances held in Croydon and Caterham, and partly to the reception of gas engineers at Waddon which he had mentioned. Law and parliamentary charges were increased by the expenditure so far incurred on the Standard Burner Bill. He might, however, say that this would have been heavier, if there had not been a strong combination on the part of a large number of companies in fighting this Bill before the House of Lords and House of Commons Committees. He had mentioned before that they undertook to contribute a certain sum with many other companies, and they had to pay a small amount compared with what they would have had to do had they fought singly. The sum of £1000 had been added to the renewal fund; and after payment of dividends, the carry-forward was increased by more than £2000, amounting now to the sum of £9671.

Looking to the early future, they would have, in the coming year, to pay rather higher prices for coal. Against this, however, might be set the fact that they had been able to buy at low prices sufficient oil to meet their requirements for a considerable time; and these gains and losses would about neutralize each other over the next twelve months. The sales of coke made under contract had been at much better prices than last year; and as the contract price of tar showed an improvement, they might, he thought, look with equanimity on their future prospects.

The DEPUTY-CHAIRMAN (Mr. Thomas Rigby), in seconding the motion, said he fully agreed with the Chairman as to the reason for the slight diminution in the sale of gas. He was confident it was on account of the weather, and that it was not due to any want, or lack, of energy on the part of the distribution department. They had done exceedingly well. There had been keen competition with the electric light in the district; and it required the keenest activity to rebut it. Against the electric light, however, they were holding their own very well indeed.

There were a few inquiries made regarding the accounts, to which the Chairman made satisfactory reply. Among other points, there was agreement with the Directors' support of the work of the Sulphate of Ammonia Committee.

Mr. WILLIAM CASH moved the declaration of dividends at the rates of 14½ per cent. on the "A" stock, 11½ per cent. on the "B" and "C" stocks, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock, all less income-tax. In the course of his remarks, he said that, although they had not in the half year enjoyed quite the amount of progress which they were accustomed to associate with the Company half year by half year, he thought the accounts were extremely satisfactory. They were carrying to net revenue £1800 more than in the corresponding half of last year; and they were also increasing their carry-forward, which was £9671. It was sometimes interesting to look back more than one half year; and if they went back three half years it would be found that the carry-forward had gone up rather more than £2000. At the same time, the reserve fund was steadily, though slowly, growing. They had added to it £2800; and to the insurance fund, £750. Therefore, the position of the Company was getting stronger each half year. Regarding co-partnership, the Board were extremely pleased with the way the scheme was progressing. The Directors had the clearest possible evidence of the value of the scheme to the Company. The proposed reduction of 1d. in the price of gas would increase the

bonus to co-partner workers for the year before them. The amount of bonus declared this half year was equal to £1300; and this was quite a substantial sum for division among the workmen. On June 30, they had fifty of the workmen who had become shareholders; and the Board were hoping with the bonus this half year to add 100 to the number of employee shareholders in the undertaking. There was no doubt the operation of the scheme benefited the Company in more ways than one. To show how much the men appreciated the scheme, he might say that the co-partners had themselves deposited with the Company, irrespective of the bonus, and out of their savings, a sum of more than £1000 during the past year. This was evidence of what an excellent staff and body of men they had working for the Company. They were really animated by the true spirit of thrift. The balance standing to the credit of the co-partners at the end of the half year was £3745; and as the scheme had only been in operation two years, the Directors were pleased with the results. For the way the scheme had been adopted, they were indebted to their General Manager, to the staff, and to the whole of the employees.

Mr. W. J. Russell seconded the motion, which was unanimously adopted.

Proposed by Mr. Maitland, and seconded by Mr. Brown, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman, having responded, proposed a vote of thanks to the officers, their staffs, and employees. He expressed the satisfaction of the Board with all that had been done in every department—specially naming Mr. Helps, Mr. Topley, Mr. Sandeman (the Superintendent of the Outdoor Department), Mr. Caddick (Mr. Helps's Assistant), Mr. Anderson (Mr. Topley's Assistant), and Mr. Haines, of the Rental Department. With regard to the workmen, he endorsed what Mr. Cash had said as to co-partnership. Neither the Company nor the workmen had any cause for regret, but just the contrary, in respect of its institution. Mr. Helps had reported that the men were all doing their best, under happy conditions.

Mr. Samuel Spencer, in seconding, said he had been down to the works that day; and it was a real pleasure to go round the place among their workmen.

Mr. Helps, in responding for his staff and the men, acknowledged the kind way in which their efforts were seconded, and every encouragement given them. He had personally to thank the Directors for the way in which they had enabled him to make his year of office as President of the Institution of Gas Engineers a successful one, and to give pleasure to the members of that body by inviting them to visit the works, and see the way in which the Board were adopting modern plant. It was something that would redound to the honour of the Company in coming years. Reverting to the staff and workmen, he said the conditions under which they worked, both in the offices and works, might be envied by the employees of many other undertakings; and he should like to acknowledge how every one of the staff and men interpreted the principle of co-operation and co-partnership, which was now, he believed, the animating principle of the Company.

Mr. Topley, in his reply, also expressed the view that it was the interest the Directors took in the whole of the staff and employees, that had brought the efficiency with which the Company's work was carried on to such a high state of perfection.

GAS SUPPLY IN NORTH LONDON SUBURBS.

At the half yearly meeting of the Southgate and District Gas Company last Thursday, the Directors reported that there had been an increase of 3,411,300 cubic feet, or 4·73 per cent., in the sale of gas in the six months ended the 30th of June last, compared with the corresponding period of 1909; and the revenue from residual products was higher by £469. The balance of profit was £6076; and the Directors recommended dividends at the rates of 5, 10, and 7 per cent. per annum upon the preference, original, and additional capital. After payment of these, there would be left a balance of £3184.

A report in very similar terms was submitted to the proprietors by the Directors of the North Middlesex Gas Company at the half-yearly general meeting yesterday. There was an increase of 4,658,800 cubic feet in the quantity of gas sold in the first half of the year compared with the corresponding six months of 1909; and the sale of residuals produced better results. There was a disposable balance of £7594; and the payment of dividends at the rates of 5, 10, and 7 per cent. was recommended, together with the addition of £609 to the reserve. This appropriation amounted to £3942, and left a balance of £3652.

TUNBRIDGE WELLS GAS COMPANY.

At the recent half-yearly general meeting of this Company, the Chairman (Mr. W. H. Delves, J.P.) said the year ended the 30th of June had been an uneventful one; and consequently there was practically nothing to report. The winter had been very mild; January, February, and March being as much like summer months as June and July had been. They had a considerable decrease (owing to the weather) in the quantity of gas consumed during the three months named. For the half year, the quantity sold showed an infinitesimal increase over the corresponding six months of 1909. The Company had not been affected by the increase in the price of coal, because they had enough raw material to last them over the half year. The consequence was they were using coal all the time bought at favourable contract prices. They were able to make a satisfactory purchase of oil, not only for this but for next year, and into about the middle of the one succeeding. Altogether, their carbonizing materials had cost them less than in the corresponding half of last year. The price of gas had been 1½d. lower per 1000 cubic feet, which was very satisfactory. The Company reduced the price by 1d. last Christmas; and the rental had been affected by it for the past half year—there being a difference of £625. The residuals, on account of the smaller quantity of coal used, had produced £164 less; but this was more than set off by the reduction in the price of coal and oil. As far as they could tell, they had had a very successful half year, and the profits abundantly justified them, not only in paying their usual dividend, but in the reduction of the price of gas. The prospects for the current six months were distinctly good. The Directors, as the shareholders were aware, had found that the storage capacity was getting short; and they had now entered into a contract to telescope one of the holders to provide more room at a moderate outlay. It was hoped to complete the work by the beginning of September. Referring to the Standard Burner Bill (No. 2), of which the Company are one of the promoters, the Chairman said that, though it had been exhaustively considered by the House of Commons Committee, and unanimously passed, further opposition was threatened for the third reading—a most unusual course—and the Royal Assent would not be given to it until after the meeting of Parliament for the autumn session. The Directors had every hope that the Bill would benefit the Company and be no detriment to the consumer. Indeed, he did not suppose the consumers would be any the wiser, except that they would find that reductions in the price of gas came about a little sooner than would otherwise be the case. Dividends at the usual rates of 12½, 10, and 9½ per cent. per annum were declared.

PROFIT-SHARING AND SAVING AT GLOUCESTER.

Satisfactory Results.

The Second Annual Meeting in connection with the Profit-Sharing and Saving Scheme of the Gloucester Gas Company was held at the works on Monday last week. Mr. J. H. Jones (the Chairman of the Committee) presided over a large attendance of members. The balance-sheet showed on one side a total of £1121 11s. 6d., and on the other the following items: By money on deposit at bank, £684 9s.; interest on ditto, £13 16s. 1d.; amount due from Company to June 30, 1910, bonus £416 11s. 10d., balance of interest £6 14s. 7d.

The Chairman, in presenting the balance-sheet, said those present would remember that when they started the scheme two years ago it was said that if it was not satisfactory either to the Directors or to the men it would be withdrawn at the end of two years. They had come to the end of the second year; and the question was whether things were satisfactory or not. So far as the Directors were concerned, they were satisfactory; and he thought, when they looked at the financial statement before them, when they saw that the sum in the bank had increased from £698 to £1121, members would come to the same conclusion. What he was so pleased to see was this—that on the withdrawal account (half of the bonus might be withdrawn) £398 2s. 7d. had been paid into the bank, and £60 1s. only had been withdrawn, and this by men who had left the Company's service. Then there was also another great cause for satisfaction—viz., that the savings bank account had largely increased. He had always thought that the opening of a savings bank account in connection with the scheme was one of its most satisfactory features; and when they found the account had increased from £231 to nearly £412, it showed that a good many of the men had taken advantage of it to do something on their own account beyond what was done for them by the bonus. It was a further cause of satisfaction to see that the price of gas had gone down—a fact which had enabled members of the scheme to have an additional ½ per cent. bonus. He was also glad to be able to tell them that the Directors had now reduced the price of gas by another 2d. per 1000 cubic feet; so that, instead of 5½ per cent. which they received for the past year, it would be 6½ per cent. for the current year. He thought they might really look upon the scheme as being beneficial to three classes of people. In the first place, it was beneficial to the shareholders—as creating a better feeling—as oiling the wheels between the Directors and shareholders and those who were engaged in the manufacture of gas. Then the object of the scheme was to prevent waste as much as possible—waste of time and waste of materials. As a result of this prevention of waste, they made the cost of gas cheaper, and the consumers got the benefit; and when they found the gas cheaper, they went in for consuming more, and this brought down the price again, and the employees got the benefit in the shape of additional bonus. This was always the way when people joined together for mutual benefit and mutual help; and this was what they wanted to see in this country and in other countries. They wanted to see good fellowship—good feeling between all classes; and he thought there was nothing more likely to bring about this state of things than some such arrangement as they had at Gloucester.

Mr. Pike moved—"That this meeting hereby approves of the statement of accounts in connection with the Gloucester Gaslight Company's Profit-Sharing and Saving Scheme now presented, up to June 30, 1910." In doing so, he said he thought the scheme was a first-class affair, and if it was properly carried out by the men, it would be to their benefit to an increasing extent, and especially to the benefit of the younger ones.

Mr. F. Jones seconded the motion, and expressed his satisfaction at the statement of accounts.

Criticism having been invited, and none being forthcoming, the motion was unanimously carried.

Mr. W. E. Vinson (the Secretary of the Company), in proposing a vote of thanks to the Chairman, said Mr. Jones had taken a very hearty and deep interest in this affair, and to his mind it was almost entirely due to his exertions that it had been built up.

Mr. W. S. Morland (the Engineer and Manager), in seconding the motion, emphasized the fact that in the two years the scheme had been in operation £1100 had been got together; and this sum would, he thought, otherwise have been spent and largely wasted. He also pointed out that the Directors had in twelve months reduced the price of gas by 3d. per 1000 cubic feet; making the net price 1s. 10 8d. to ordinary consumers, and 1s. 8d. for gas-engines.

The Chairman acknowledged the vote, and expressed his gratification that the scheme had been so satisfactory. He proposed a vote of thanks to the Secretary (Mr. T. B. James).

This having been accorded, the proceedings closed.

WAKEFIELD GAS COMPANY.

The Recent Explosion in the Purifier-House.

In moving the adoption of the report and accounts at the half-yearly meeting of the Wakefield Gas Company on Monday last week, the Chairman (Dr. W. A. Statter, J.P.) referred to the explosion which took place in the purifier-house on the 20th of June, which was noticed in the "JOURNAL" at the time. He said it had given the Directors some anxiety, but he was thankful that it had not interfered in the slightest degree with the supply of gas to the consumers. The house which was wrecked had long been a source of anxiety to their Engineer and Manager (Mr. H. Townsend), as it was built over an old gasholder tank which was now used for storing ammoniacal liquor; and in carrying out the repairs to the purifiers, which was the immediate cause of the accident, he had used every possible precaution, having thrown the house out of use altogether, and warned the men of the risk of dropping anything hot. They had fortunately well insured their works against fire and explosion, and had been met in a very fair spirit by the Insurance Companies, who had agreed with the Directors that it would be better, especially after their recent experience, to erect new purifying plant on another site than to attempt to restore the old purifiers. Plans were accordingly prepared by their Engineer and Manager, and the contract for new purifiers and revivifying sheds was let within a week of the accident. Their erection was now well in hand, and the insurance money would go a considerable way towards paying for them. He was happy to say that two of the men who were injured had now been at work some time, and the third had been sent by the Directors to the seaside, whence they hoped he would soon return fit for work again. He should like to take this opportunity of acknowledging the pluck and loyalty shown by their Manager and staff and all the workmen, and also by the Wakefield Fire Brigade, who all toiled, utterly regardless of danger, to remedy as soon as possible the damage done, and get the works going again, which they were fortunately able to do within about seven hours of the accident. This unfortunate occurrence had strengthened the Directors' belief in the value of insurance, and in the straightforward and upright manner in which the Insurance Companies agreed to meet their obligations. Referring to the progress of the Company, the Chairman said they had had a prosperous half year, having more than earned their usual dividend, while the make of gas per ton of coal carbonized—11,441 cubic feet—exceeded all previous records in the history of the Company, and was particularly gratifying, as they were still working under their old standard. He concluded by proposing the payment of the usual dividends; and this was agreed to. Dr. Statter and Mr. E. White having been re-elected Directors, and Mr. W. H. Shaw appointed Auditor, in succession to Mr. Hopkinson, who had retired through ill-health, Mr. A. Firth proposed that the best thanks of the shareholders be given to the Chairman and Directors for their conduct of the Company's business during the past half year. This was seconded by Mr. H. H. Audsley, and carried. In responding, the Chairman proposed a hearty vote of thanks to the Engineer and Manager and to the Secretary (Mr. R. B. Wilson) and their staffs. The proposition was carried, and responded to by both gentlemen. These votes of thanks were passed by the shareholders with more than the usual heartiness, in appreciation of the heavy strain which had recently been borne by all concerned.

MAIDSTONE GAS AND WATER COMPANIES.

At the recent annual meeting of the Maidstone Gas Company, the Directors reported that the balance in favour of the Company for the year ended the 30th of June was £13,208; and they recommended a dividend at the rate of £7 5s. 6d. per cent. per annum (less income-tax)—an interim dividend at this rate having been paid on the 1st of March. In moving the adoption of the report, the Chairman (Mr. G. Marsham) said that, notwithstanding several adverse circumstances, the Directors were able to present a more favourable balance-sheet than last year; for, in spite of a decrease of 1¾ per cent. in the quantity of gas sold, and a considerable falling away in the prices obtained for residuals, there was a net surplus of £2133. Out of this, £2000 had been set aside for depreciation of stoves and fittings on hire—a larger sum than for several years—and £133 was carried forward. The falling away in the sale of gas was owing, no doubt, to its more economical use in large institutions, and to the extended employment of incandescent burners. He was pleased to say that the prices of residuals, which had been exceptionally low, were now showing signs of improvement. The increased profit was partly due to the price of coal, to the larger make of gas per ton of coal—there having been extracted the record of 11,733 cubic feet—and to the decreased leakage, which now stood at 5·71 per cent., which was a very satisfactory figure when it was considered that the Company served 9807 meters through nearly 78 miles of mains. A considerable part of the decreased sale of gas was, he might also mention, due to the action of the Corporation in converting a number of public gas-lamps into electric lamps. But, as shown by the increased rental of meters, stoves, and fittings, the Company's business continued to expand satisfactorily in various ways. For the first time, the revenue account showed a contribution to the new workmen's superannuation fund; the amount for the year being £48 12s. 3d. It was proposed to invest this fund in the debenture stock of the Company, which would give the men, with their existing sick fund investment and individual holdings in gas stock, an increased interest in promoting the success of the Company's business. Last year, he alluded to the adoption of the Botley system for the prevention of stoppages in the mains and services through the deposit of naphthalene; and he was glad to say these stoppages were gradually decreasing. This was obviously a boon to the consumer as well as a saving to the Company. The report was adopted and the dividend recommended declared.

In the report presented at the half-yearly meeting of the Maidstone Water Company, the Directors stated that the water-rents for the six months ended the 30th of June amounted to £6882—an increase of £54 compared with the first half of 1909. The accounts accompanying the report showed a sum of £5299 to the credit of the profit and loss account; and the Directors recommended the payment of a dividend, free of income-tax, for the half year at the rate of £7 10s. per cent. per annum on the 10 per cent. shares, and of £5 5s. per cent. on the 7 per cent. shares and the ordinary share capital. These payments would absorb £1680, and leave £3629 to be carried forward. The Chairman (Mr. W. H. Bensted), in moving the adoption of the report, said the increase in supplies, both domestic and by meter, was a matter for congratulation, though the number of empty houses in the town had gone up from 262 in February to 279 at the present time. He read the report of Dr. Sims Woodhead, who expressed the opinion that the gathering-grounds, springs, and water-works of the Company are efficiently protected. A report was also presented by Mr. W. Burgess, showing that, as the result of chemical analysis, the water is of high organic purity. The Directors' report was adopted, and the dividends recommended were declared.

PROPOSED SALE OF THE AMERSHAM GAS-WORKS.

The Terms of Transfer.

It was briefly mentioned in the "JOURNAL" last week (p. 479), that the shareholders of the Amersham Gas Company had agreed to a proposal to sell the undertaking to the Uxbridge Gas Company. The decision was come to at a special meeting held for the purpose of considering the provisional agreement entered into; and the notice convening it furnished the following particulars.

The proposed arrangements with the Uxbridge Company were the result of negotiations entered into in consequence of the resolution passed at the general meeting on the 26th of April, recommending the Directors to approach a neighbouring Company with a view to amalgamation or sale. The Directors strongly recommended the shareholders to approve of the arrangements, and pointed out the difficulty of raising capital for a small non-statutory Company; and they feared that without sufficient capital to extend operations, the Company would in time find itself squeezed out by larger adjoining concerns. The terms obtained from the Uxbridge Company were, in the opinion of the Directors, fair and generous, as the shareholders would receive their money in full, and, with the reserve fund, stock, and the profits of the last half year to divide, a substantial dividend on the final completion of the business. The Directors added that, as to the public, the proposed arrangements would be very advantageous, as the price of gas would be reduced as from the 30th of June last from 5s. to 3s. 6d. per 1000 cubic feet; and this consideration had effect with them in recommending approval of the sale.

The provisional agreement is to the following effect: (1) The Uxbridge Gas Company take over the business as from June 30, 1910. (2) The undertaking is sold subject to debentures of the Amersham Company, which the Uxbridge Company will either pay off in due course, or the holders may have in exchange for their debentures 4 per cent. debenture stock of the Uxbridge Company. (3) The purchase price is the par value of the Amersham Company's shares. (4) The Amersham Company retain their reserve fund, and are to be paid for stock at June 30, 1910. (5) The Uxbridge Company will promote a Bill or Provisional Order next session to obtain parliamentary powers for supplying the Amersham district. The Amersham Company are to concur in such application; and any expenses incurred by them are to be paid by the Uxbridge Company. (6) The agreement is subject to sanction by the shareholders of the two Companies, and to the necessary parliamentary powers being obtained.

MELDRETH AND MELBOURN GAS AND WATER COMPANY.

Serious Financial Position.

A Statutory Meeting of creditors in the Meldreth and Melbourn District Gas and Water Company, Limited, was held at the offices of Messrs. J. W. Barratt and Co., Coleman Street, E.C., last Wednesday. There were five creditors present.

Mr. BARRATT explained that the debenture-holders and shareholders in the Company had already met and asked him to act as Liquidator (see *ante*, p. 217). The position of the Company made it impossible to hope that there would be anything for the shareholders or creditors; and it was very doubtful if the debenture-holders would see their money back. All the negotiations he had entered into for the sale of the Company's business had failed even to produce an offer, except in a few cases where the price tendered would not have covered half the debenture debt. In the circumstances, the only thing to be done was to offer to sell the concern to the local authorities. All the facts had been placed before the President of the Local Government Board, whose reply they were now awaiting. If they could get the Board to take the matter up, they would do much better than by going elsewhere—at least, they would get a fair price. Failing this, there would have to be a sale by public auction; and this was certain not to realize the amount of the debenture debt.

A CREDITOR inquired as to the validity of certain debentures that had been issued before Mr. Barratt was appointed.

Mr. BARRATT said the debentures in question amounted to £100. Whether or not there had been an informality in their issue was a matter which did not concern them, unless there was a surplus from the sale of the business after meeting the other debenture debts. If there was one, he should certainly not distribute it until this point had been settled. He did not know that there was a valid consideration for these debentures; and the only question to be considered was the date of their issue.

Mr. ROOK said that, as creditors, they could not do anything better for their own interests than follow the example of the shareholders and others, and leave the matter in Mr. Barratt's hands.

This suggestion was formally agreed to without discussion; and the meeting terminated.

IMPROVEMENTS AT GISBORNE (N.Z.) GAS-WORKS.

Manager's Salary Increased.

According to an account given in a paper published in Gisborne (N.Z.), the increased business of the local Gas Company has necessitated considerable extension of the works and plant; and this has been carried out under the supervision of Mr. Henry Hoare, the Engineer, Manager, and Secretary of the Company. The extent of the changes effected will be seen from the following particulars.

When the Company commenced operations 27 years ago, they had only one bench of two retorts; whereas now they have six benches, with a total of 32 retorts. In the early days, the price of gas was 17s. 6d. per 1000 cubic feet; now it is only 7s. 1d. The original gasholder, capable of containing only 7000 cubic feet, becoming inadequate, another, of 15,000 cubic feet capacity, was erected. This was followed by one equal to holding 60,000 cubic feet of gas. Subsequently, the services of Mr. Hoare were secured, and he has reorganized the whole of the works. A new retort-house, of ample dimensions, and a large coal-shed have been built, and two benches of six retorts, with regenerative furnaces, installed. An order was placed with Messrs. C. & W. Walker, of Donnington, Salop, for a two-lift gasholder capable of containing 150,000 cubic feet, which nearly doubles the storage capacity. With the exception of the holder, this plant has been in operation for some time. A new condenser was made and erected by the Company's own staff; and an exhauster, capable of passing 10,000 cubic feet per hour, was purchased and fixed last September. A Livesey washer and a Kirkham washer-scrubber, each of the above-named capacity, a 10-inch governor, and a station meter are in operation. The old boiler has been replaced by another of 10 H.P., to contain which and the exhauster a house has been built, with messroom, bath-room, and hot and cold water for the comfort of the employees. These changes have, of course, necessitated a considerable number of alterations to the pipes and connections all over the works; but they have been carried out without for a moment stopping the supply. Outside the works, nearly three miles of mains, from 3-inch to 9-inch, have been laid, and the side streets connected up. Exterior shop lighting by "Graetzin" inverted burners has been introduced; and in order to show the public the latest types of gas appliances, a commodious room at the offices has been set apart for the purpose. In carrying out these improvements, Mr. Hoare has been his own architect, engineer, and clerk of works; and, with the exception of the gasholder and tank, which were erected by Messrs. Niven and Co., of Napier, he has done all the work with his own staff.

At the last ordinary general meeting of the Company, the Directors, in presenting their report, accompanied by a statement of accounts for the fifteen months ended the 31st of March, congratulated the proprietors on the continued success of the undertaking. The consumption of gas showed an increase of upwards of 4·33 million cubic feet, or 15 per cent., compared with the preceding similar period. The cost of production and distribution had been increased, owing to the long-continued miners' strike at Newcastle raising the cost of coal, and also to the considerable advance in labour. However, there was a sum of £11,932 available for distribution; and the Directors recommended that £6500 should be carried to the reserve fund, £2500 to a plant and buildings adjustment account, and a dividend of 9d. per share paid on 21,800 shares, or £794—the balance of £2138 carried forward. These recommendations were approved of. The Directors testified their appreciation of Mr. Hoare's services by giving him a bonus of £100 for his extra work in connection with the extensions described above, increasing his salary £100 per annum, and entering into an agreement with him for five years' continuous service.

METER AND GAS TESTING IN EDINBURGH.

The Official Inspector of Gas-Meters for the City of Edinburgh (Mr. William Gordon) lately presented his fifth annual report, containing an account of the working of the department under his supervision from May 16, 1909, to May 15, 1910. He states that the number of gas-meters tested was 89,027, of which 13,658 were wet and 75,369 dry; and fees to the amount of £2441 10s. were collected. Of the wet meters, 20 were incorrect; of the dry ones, 834.

During November last year, the Government standard gas models were re-verified by officials from the Standards Department of the Board of Trade; and the results of the test were very satisfactory—the instruments being practically correct. The largest meter tested during the twelve months was manufactured by a local firm to the order of the War Office. It was constructed to pass fully 20,000 cubic feet of gas per hour, and was to be erected at the Government Balloon Factory, Farnborough, to accurately measure the gas required for the British Army airships.

Last April, Major P. A. MacMahon, F.R.S., Deputy-Warden of the Standards, visited the department for the purpose of supervising the re-verification of the working gasholders—twenty in number. The usual period for re-verifying test gasholders belonging to a local authority is at the expiration of ten years; but Mr. Gordon considers that, owing to the great number of meters tested in Edinburgh, it is advisable, in the interests of exactitude, that a quinquennial test of the gasholders should in future be carried out.

The total number of meters tested by the Department since its institution in 1861, up to and including May 15, 1910, is 2,429,671—*i.e.*, 1,027,548 wet and 1,402,123 dry; the fees received for the same period being £71,316 8s. For the year ended the 15th of May, the number of automatic meters tested exceeded those of the ordinary type by 2407. Last year the difference was still greater; 40,985 automatic meters being stamped, against 30,704 of the ordinary kind. These figures appear to point to the fact that local authorities and gas companies are continuing to recognize the benefits derived from fixing automatic meters, and are consequently encouraging consumers to purchase gas "by the pennyworth."

Following the report on meters is one on the testing of gas. It is set forth therein that on Dec. 21, 1908, the Edinburgh and Leith Gas Commissioners' Provisional Order was duly confirmed; and since that

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 508.

Issue.	Share.	When ex. Dividend	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord. .	80–83	..	6 0 5
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	97–99	..	4 0 10
200,000	5	May 12	7	Bombay, Ltd., ...	6¼–6¾	..	5 7 7
40,000	5		7	Do. New, £4 paid .	4⅜–5⅛	..	5 9 3
50,000	10	Feb. 25	15	Bourne-) 10 p.c. . .	29–30	..	5 0 0
311,810	10	,,	7	mouth Gas) B 7 p.c. .	16½–16⅝	..	4 3 7
75,000	10	.	6	and Water) Pref. 6 p.c.	15–15½	..	3 17 5
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	246–249*	..	5 0 5
330,000	,,	,,	9½	Do. New . . .	184–186*	..	5 2 2
50,000	,,	,,	5	Do. 5 p.c. Pref. .	—	..	—
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	99–101	..	3 19 3
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	214–217	..	5 1 5
246,320	,,	,,	8	Do. A Ord. Stk. .	153–156	..	5 2 7
460,000	20	Apl. 1	10⅝	British	44⅛–45½	+½	4 13 5
109,000	Stk.	Aug 11	6	Bromley, A 5 p.c. . .	117–119*	..	5 0 10
165,700	,,	,,	4½	Do. B 3½ p.c. . .	88–90*	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c. . .	106–108*	..	5 1 10
55,000	,,	June 29	3½	Do. 3½ p.c. Deb. .	85–87	..	4 0 6
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	97–99	..	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	3–4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref. .	5⅜–6⅛	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	49–50	..	6 0 0
100,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	88–90	..	5 0 0
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord. . .	108½–110½*	..	4 10 6
1,513,280	Stk.	,,	5⅝	Commercial 4 p.c. Stk. .	105–107*	..	4 17 2
560,000	,,	,,	5	Do. 3½ p.c. do. .	101–103*	..	4 17 1
475,000	,,	June 29	3	Do. 3 p.c. Deb. Stk.	80–82	..	3 13 2
800 000	Stk.	June 10	5	Continental Union, Ltd.	93–95	+3	5 5 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–137	..	5 2 2
492,270	Stk.	—	5½	Derby Con. Stk. . . .	122–124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk. . . .	104–105	..	3 16 2
148,995	,,	Apl. 1	5	East Hull 5 p.c. Ord. .	96–98	..	5 2 0
486,090	10	July 14	12	European, Ltd. . . .	23¾–24	..	5 0 0
354,060	10		12	Do. £7 10s. paid.	17⅞–18¼	..	4 18 8
16,179,445	Stk.	Aug. 12	4⅝	Gas) 4 p.c. Ord. . .	104½–105¾*	+½	4 8 5
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	87–89*	..	3 18 8
4,062,235	,,	,,	4	and) 4 p.c. Con. Pref.	102–104*	..	3 16 1
4,531,705	,,	June 29	3	Coke) 3 p.c. Con. Deb.	80–82	..	3 13 2
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93–95	..	5 5 3
82,500	,,	,,	5½	Do. do. 5 p.c.	117–119	..	5 9 3
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17–17⅛	..	6 5 9
131,000	Stk.	Mar. 16	7	Ilford A and C . . .	145–147	..	4 15 3
65,780	,,	,,	5½	Do. B	114–116	+3	4 14 10
65,500	,,	June 29	4	Do. 4 p.c. Deb. . . .	98–100	..	4 0 0

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	8	Imperial Continental .	177–179	..	4 9 5
1,235,000	Stk.	Aug 12	3½	Do. 3½ p.c. Deb. Red.	92–94*	..	3 14 5
200,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c. .	122–124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A. .	219–221	..	4 10 6
718,100	,,	,,	7	Do. B . . .	165–166	+1	4 4 4
306,083	,,	June 29	4	Do. Deb. Stk.	104–106	..	3 15 6
75,000	5	June 29	6	Malta & Mediterranean.	4⅛–4⅜	..	6 4 8
560,000	100	Apl. 1	5	Met. of) 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd. . .	12½–13	..	5 7 8
1,775,892	Stk.	July 28	4½	Newc'tle & G'tesh'd Con	101–102	..	4 5 9
529,435	Stk.	June 29	3½	Do. 3½ p.c. Deb.	90–91	+½	3 16 11
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	13¾–13⅞	..	5 1 10
300,000	Stk.	Apl. 29	8	Oriental, Ltd. . . .	138–140	.	5 14 4
60,000	5	Apl. 1	8	Ottoman, Ltd. . . .	6¼–6⅜	..	6 3 1
31,800	53	Feb. 25	13	Portsea Island A. . .	134–136	.	5 1 0
60,000	50	,,	13	Do. B. . .	126–128	..	5 1 7
100,000	50	,,	12	Do. C. . .	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Apl. 29	7	Primitiva Ord. . . .	7⅛–7⅜	..	4 14 1
796,980	5	June 29	5	Do. 5 p.c. Pref. .	5⅛–5⅜	−⅛	4 14 1
488,900	100	June 1	4	Do. 4 p.c. Deb. .	97–99	..	4 0 10
312,650	Stk.	June 29	4	River Plate 4 p.c. Deb. .	97–99	..	4 0 10
250,000	10	Apl. 1	9	San Paulo, Ltd. . . .	15⅝–16½	..	5 10 9
62,500	10	,,	6	Do. 6 p.c. Pref. .	11⅜–12⅛	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb. .	49½–50½	..	4 19 0
135,000	Stk.	Mar. 16	10	Sheffield A	234–236	..	4 4 9
209,984	,,	,,	10	Do. B	234–236	..	4 4 9
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	May 27	7	South African	11–11½	..	6 1 9
6,429,895	Stk.	Aug. 12	5/9/4	South Met., 4 p.c. Ord.	120–122*	..	4 9 7
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	79–81	..	3 14 1
209,820	Stk.	Mar 16	8	South Shields Con. Stk.	157–158	..	5 1 3
605,000	Stk.	Aug 12	5⅜	S'th Suburb'n Ord. 5 p.c.	119–121*	..	4 13 7
60,000	,,	,,	5	Do. 5 p.c. Pref. .	119–121*	..	4 2 8
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	120–122	..	4 2 0
502,310	Stk.	May 12	5	Southampton Ord. . .	110–112	..	4 9 3
120,000	Stk.	Aug. 12	7	Tottenham) A 5 p.c. .	136–138*	..	5 1 5
483,940	,,	,,	5½	and) B 3½ p.c. .	111–113*	..	4 17 4
149·470	,,	June 29	4	Edmonton) 4 p.c. Deb.	57–59	..	4 0 10
182,380	10	June 10	8	Tuscan, Ltd.	9–9⅜	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	97–99	..	5 1 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	113–115	..	4 6 11
255,636	Stk.	Feb. 25	6¾†	Wands-) B 3½ p.c. . .	139–141	..	4 15 9
85,766	,,	June 29	3	worth) 3 p.c. Deb. Stk.	73–75	..	4 0 0

Prices marked * are "Ex div." † Next dividend will be at this rate.

date the work of testing the gas for illuminating power has been carried on continuously. The minimum is fixed at 14 candles, when measured with a "Metropolitan" No. 2 argand burner consuming 5 cubic feet of gas per hour; the standard of light being a Harcourt ten-candle pentane lamp. The Inspector carried out tests at various hours, chosen at his own discretion, and without any previous intimation to the Gas Commissioners of his intentions; and during the year, 303 tests were made at the City Chambers—the average result being 17·22 candles, compared with 18·65 candles in the preceding year.

The Inspector points out that the Legislature have recently induced the Gaslight and Coke Company to initiate a test to accurately determine the calorific value, in addition to the illuminating power, of the gas supplied by them. But the Board of Trade have authority to vary the standard, on appeal by either of the interested parties, at the expiration of three years. It can therefore be assumed, he says, that the calorific test "is at present in an experimental stage." It may, however, at a future date be necessary to have a subsidiary test to ascertain the heating value of the gas supplied to Edinburgh consumers; but, under present conditions, he considers that the existing illuminating power tests meet all requirements, and that the interests of the consumers are adequately safeguarded. The minimum results of the testings were on all occasions considerably above the standard illuminating power of 14 candles; and all the tests were carried out under the conditions prescribed by the Metropolitan Gas Referees.

MUNICIPAL LOANS FOR TRADING UNDERTAKINGS.

Local Government Board's Power to Dispense with Public Inquiry.

That the Local Government Board may dispense with the holding of a public inquiry in the case of a local authority's application for sanction to borrow money for trading departments, extension, or development, seems to be borne out by what has happened recently at Manchester. The Electricity Committee of the Corporation applied for sanction to a loan of £40,000 for extensions; and the necessary permission was granted without a public inquiry being held.

The right of the Department to do this was challenged by the Manchester Ratepayers' Association. Mr. P. Percival, the Secretary, in the course of a communication to the Local Government Board on the subject, said: "I am informed that tentative sanctions were given to some portions of the loan by the Board before coming to the decision not to hold an inquiry. My Association would like to be informed whether any portion of the £40,000 referred to has been the subject of a public inquiry, and also, if possible, when the sanctions referred to were conferred." Replying to this letter, the Assistant-Secretary of the Local Government Board said that loans amounting to £40,000 were sanctioned by the Board for works connected with the Manchester Electricity undertaking on June 2. The Board did not consider it necessary to hold a public inquiry before sanctioning the loans.

Mr. Percival was not disposed to let the matter rest there. In a further letter to the Department, he said that, for the satisfaction of his Association, he would like to know on what authority the Board relied in holding itself at liberty to dispense with a public inquiry into such an application as that of the Manchester Electricity Committee. "I may say," he added, "that my Association feels very strongly the necessity for maintaining the control of the ratepayers over the expenditure of the various Committees of the Manchester Corporation, and seriously deprecates any change of procedure in the sanctioning of loans calculated to weaken that control, or in any way to remove the financial operations of any Committee from the field of local criticism."

THE SUGGESTED NATIONAL WATER BOARD.

Two Views on the Proposal.

As the result of the publication as a Blue-Book last week of the report of the Joint Committee of the two Houses of Parliament on the Water Supplies (Protection) Bill, a representative of the "Birmingham Daily Post" had an interview on the subject with Mr. E. Antony Lees, the Secretary of the Water Department of the Corporation. In the course of their conversation, Mr. Lees said: There is a natural limit to the water supply of the country, and, looking at the matter in the wider sense, I believe all the practical water administrators in the country are in favour of the establishment of a Board charged with the duties outlined by the Parliamentary Committee. The scheme will be beset with a great deal of difficulty when practical details come to be dealt with; but the idea is a good one. It has been mooted by water administrators for years and years, and has been mentioned in parliamentary reports two or three times. If it were carried out as it is desired it should be carried out, the Board would certainly take very much more than formal cognizance of big water schemes. It would have regard to the economical distribution of the national water resources from the standpoint of the requirements of the whole country; not merely from that of the needs of an individual authority seeking a particular source of supply. Taking note of the water resources of the country as a whole, the Board, in the allocation of any particular source to the needs of any one district, would consider whether, in the interests of the country at large, it was right that the water should be allocated for distribution. For example, if it had been in existence before the Birmingham scheme was initiated, the Board would have had to consider whether, from the national point of view, it was well that the particular water area in Wales should be given over to Birmingham, having regard to the city's distance from the source, its prospect of development, and the ultimate yielding capacity of its own watershed.

Some objectionable features of the scheme were indicated by Mr. P. W. Walker, the Secretary of the East Worcestershire Water Com-

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pany. He said it was difficult to ascertain what was really behind the proposal; but he thought it might represent a desire to get water supplies out of the hands of companies into those of local authorities. It was to the interest of a company that its sources of supply should be most economically used; and in his Company's district the greatest care was taken to this end. A National Water Board would, however, be useful as an authority for the consideration of applications by companies and local authorities for the extension of their areas of supply. At present, the country was not properly supplied with water; and it was very likely that many new water companies would be launched. In these circumstances, it might be most desirable to have an authority that would see that the best use was made of the supply available for a particular district. Mr. Walker added that in his Company's district there were many probable sources of good water untapped; and he thought the same might be said generally of the country as a whole. On the subject of the Bill which gave rise to the Joint Committee's suggestion, he declared that some of its provisions were perfectly absurd. It not only proposed to make water undertakers liable to give compensation for injury to private supplies caused by their works, but placed upon them the onus of proving that no injury was inflicted. It also proposed that where water was taken from one district to supply another, the local authorities of the districts from and through which the water was taken should be given the right to demand a supply from the works of the undertakers on terms to be agreed or fixed by the Local Government Board. In reference to both of these provisions, there was, he said, considerable ground for objection by the proprietors of water undertakings.

MANCHESTER CORPORATION WATER SUPPLY.

The New Pipe Line from Thirlmere.

At the Meeting of the Water Committee of the Manchester Corporation last Thursday, it was reported to them that the work of laying a third line of pipes from Thirlmere to the city is progressing satisfactorily. The Contractor at the northern end has laid 4½ miles of pipes out of the 14 miles that he has to put down. In another case, the Contractor has got through his task to the extent of 6½ out of 18 miles. A contract for another length has been let, and the work is about to begin. The third Contractor has undertaken to lay the line of pipes between Little Hulton and the Denton reservoirs—a distance of 14 miles, through Worsley, Stretford, Davyhulme, Chorlton, and Levenshulme. Altogether, when the work is finished, there will be about 52 miles of iron piping for Manchester's service.

It may be remembered that the work of bringing water from Thirlmere to Manchester was begun in 1886; but it was not until 1894 that a daily flow of 10 million gallons from the lake was a reality. Ten years later, in 1904, the second pipe was brought into action; and it is stated that the Committee will be well satisfied if by 1914 the third pipe is ready for use. After that they will doubtless lose no time in setting men to work on the fourth, and subsequently on the fifth and final pipe. With five pipes in use, the daily flow will be nearly 50 million gallons; and this is all Thirlmere can give. The tunnelling through some miles of rock was, of course, done for all the pipes in the first instance. The biggest piece of work that has now to be carried out is between Little Hulton and Denton. New tunnels have to be made under the Ship Canal and the Bridgewater Canal, and eight or nine railways have to be crossed. At Denton, the Corporation have land for two more reservoirs; but it is hoped the present one will suffice for the reception of the water brought by the third new pipe, and perhaps by the fourth and fifth pipes.

INCREASED WATER SUPPLY FOR MINEHEAD.

In view of the growing popularity of Minehead (on the Somersetshire coast) as a holiday resort, and the consequent extension of the town, the Urban District Council some four years ago found themselves compelled to deal with the problem of improving the water supply. They accordingly consulted Mr. A. P. I. Cotterell, M.Inst.C.E., of Bristol and Westminster, on the formulation of a scheme providing for a population of 2700 in winter and 5000 in summer. He advised the Council to further utilize the water from Longcombe; and it was decided to erect works at a spot some 300 yards farther up the combe than that from which the present supply is obtained. The Council were met most liberally by the late Mr. G. F. Luttrell, the owner of the property, who allowed them to take water from a gathering-ground of some 400 acres, at the low rental of £30 a year for the first twenty years, and £50 afterwards. The Council obtain from this area, which is 1000 feet above the sea, 200,000 gallons per day of pure spring water—double the amount of the present supply. A stream is tapped at a point 550 feet above sea level, where the water is first directed into roughing filters, and then passes into a collecting-tank, whence it flows through a 4-inch main along the route of the old main, and into the existing service reservoir, 300 feet above the town. In future, the pipe-line may be extended to a new storage reservoir of 5 million gallons capacity in the Moor Valley, 400 feet above the sea, giving sufficient pressure to serve the highest houses in Minehead. Under the present arrangement, the intermediate village of Alcombe takes 20,000 gallons a day; and the remainder will be sufficient for Minehead for some years to come. The scheme has the great advantage of being easily extended as need arises. Mr. Cotterell personally superintended the construction of the works, which were carried out by Messrs. F. Small and Co., of Taunton. The ceremony of turning on the fresh supply was performed on the 13th inst. by Mr. A. F. Luttrell, the Squire of Dunster, in the presence of the Chairman (Mr. J. Phillips), members, and officials of the District Council, and a number of friends. Congratulations were expressed at the Council having secured, at the low figure of £3500, a supply of excellent water sufficient for present and future needs.

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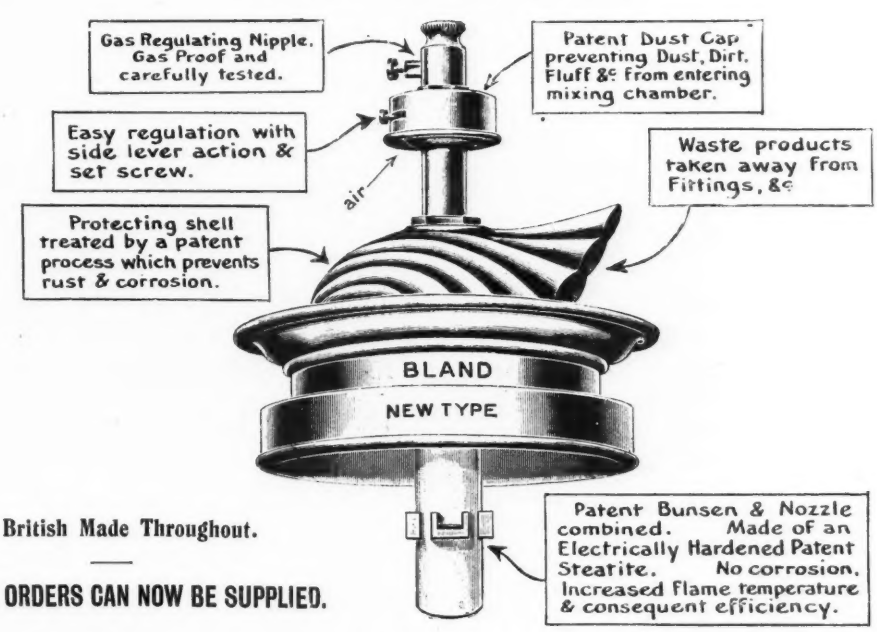
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WATER DIFFICULTIES IN SPAIN.

The question of water supply in Spain seems to be one of almost perpetual difficulty—at least that is the general impression one gets from the information imparted to shareholders at a recent meeting of the Seville Water-Works Company. But so far as that Company are concerned, there is an easy way out of the difficulty, if reason and experience prevail. The matter was referred to at length by the Chairman (Mr. Cowley Lambert) at the annual meeting the other day, after he had presented the report and accounts, which, by the way, showed an income amounting to £39,131. After deducting working expenses, the cost of laying on services, and the service of debentures, the net profit for the year was £8853, as compared with £4708 in the previous year. Adding the unappropriated profit at March 31, 1909—namely £10,125—the amount standing to the credit of profit and loss account was £18,978. The Directors recommended that a dividend be paid of 2 per cent. on the share capital for the year free of income-tax (absorbing £5422), that £5000 be transferred to reserve (bringing this account up to £10,000), and that the balance of £8556 be carried forward.

In his comments on these figures, the Chairman said the net profit for the year amounted to £8853—£4145 more than last year. This was accounted for by an increase in the net revenue in Seville of £3689, by a decrease in London expenses of about £200, and by differences in the Company's favour in exchange of some £250. Regarding the increase in the net revenue in Seville of £3689, there was an increase in the water-rentals of some £800, and a decrease in the expenditure of £2700. This decrease was principally due to a diminution of expenses in connection with the additional supply of water during the drought. There was also a considerable reduction in the taxation account owing to the rearrangement of the incidence of taxation in Spain. There was also a considerable decrease in the pumping and engine charges. The Manager in his report referred to the solution of the water difficulty, and told them that conferences had been going on between himself and the authorities during the past twelve months. These conferences had at length been brought to an issue by the presentation of a scheme on the lines the authorities had stated they were prepared to accept for a further supply of water, and the scheme was now being considered by the Water Commission. The Chairman paid a handsome tribute to the energy, ability, and tact the Manager (Mr. J. J. Bithell) and his associates on the one hand, and the Alcalde, the members of the Water Commission, and the local leaders of the political parties on the other, had displayed in this matter. Dr. Seras, the Chief of the Hygienic Institute of Seville, had been to London, Paris, Antwerp, and certain German cities, to make a personal study of the question of water supply; and he (the Chairman) was confident that the knowledge he had gained would be of great service to Seville. A company that was dependent on springs for water could not possibly give a full supply when the springs ran dry. This was their case; and they had been anxious to give a perfectly pure and wholesome supply of water from the River Guadalquivir; but up to now there had been great hostility. He was amazed in this Twentieth Century that there should be found, among such intellectual and accomplished people as the Sevillians, persons who were capable of putting obstacles in the way of furnishing a good and pure supply of water to the people of Seville by casting doubts on the scientific assurances of some of the greatest of the hygienic professors of the day. He hoped and believed that more reasonable counsels would now prevail; and that a river scheme would be carried out for the great benefit of the city, the people, and the Company. He could not yet put the scheme definitely before the shareholders; but this he could say, that, in order to execute it, an issue of preference shares would have to be made. The Board were satisfied, through estimates and figures, that the business would be so much increased that, after paying a dividend on the preference shares, they would be able to add considerably to the dividend now paid on the ordinary shares.

The report and accounts were adopted, the dividend recommended declared, and the retiring Directors (Messrs. Easton Devonshire and Cowley Lambert) were re-elected, as were also the Auditors. A special vote of thanks was passed to Mr. Bithell and his staff.

Effect of the Coal Mines (Eight Hours) Act.

At the monthly meeting of the Cardiff Chamber of Commerce last Wednesday, the President (Mr. Trevor Jones) said the Eight Hours Act, since it came into force, had done an immense amount of harm, and resulted in a big loss to the South Wales coalfield. The figures prepared by Mr. F. L. Davis showed that there was a lessened production per man, despite the facts that large numbers of extra men had been given employment and that several new collieries had been opened up in the district. During the first seven months of the present year, the decreases in South Wales were: Cardiff, 307,722 tons; Newport, 252,800 tons; and Swansea, 55,213 tons. There was a gain at Port Talbot, however, of 220,377 tons. Mr. W. Straker, the Secretary to the Northumberland Miners' Association, reporting to the International Miners' Committee on the recent trouble in the county arising out of the Eight Hours' Act, states that during the whole of the strike the men were supported from the funds of the Association, which many regarded as unconstitutional. But such was the general feeling against the three-shift system, that this support was approved by a large majority of members. The cost to the Association amounted to upwards of £83,000.

Accounts appeared in the papers last week of a pathetic incident which had occurred at Lynmouth, North Devon, where a young man named Morris, of Roehampton Street, London, who was on his honeymoon, was drowned in sight of his wife. The unfortunate man was one of the clerical staff of the Gaslight and Coke Company.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In preparation for the Smoke Abatement Exhibition which is to be opened in Glasgow in a few weeks' time, there was published in the "Glasgow Herald" of Thursday a long article, in which much information was given as to the use of gas for heating purposes. The writer began by remarking that many suggestions for the removal of the smoke evil had been put forward. Smokeless fuel and heating by electricity had their advocates; but so far as the domestic chimney was concerned—and admittedly the domestic chimney was a great contributor to the fouling of the atmosphere—the solution was likely to be found in the greater utilization of gas for purposes of cooking and heating. Electric heating was still too costly for the average householder. On the other hand, the development of gas engineering within recent years had been so great that there seemed no good reason why there should not be a general adoption of gas-fires. Certainly the Gas Department of the Corporation could not now be accused of inactivity in pushing their wares. Show-rooms had been opened in various districts of the city and in the suburbs; and the recent opening of central premises in Sauchiehall Street had already resulted in an increased demand for gas-stoves and heating apparatus. The prejudice against the use of gas for the purposes indicated, which undoubtedly existed in Glasgow, was, owing to the more aggressive policy of the Corporation, being gradually broken down. The gas-cooker was coming into greater vogue. The number of stoves on hire was, of course, small in proportion to the number of gas consumers; but during the past seven years there had been a steady increase. In 1903-4, there were only 26,657 cookers on hire; whereas there were now 52,696, in addition to 15 106 free grillers. Recently there had been a gratifying increase. There were in use 4000 more stoves than was the case a year ago, and 5000 more grillers. The outlook was very encouraging, for the low price at which gas was now sold was bound to assist towards the more general adoption of gas-cooking appliances. It was satisfactory to learn, also, that, synchronizing with the increase of stoves, there was a decrease in the capital outlay of the Gas Department. Thus in 1903-4 the total capital standing in the books against the Stoves Department was £50,398, or £1 19s. 3d. per stove. The latest return showed the total capital to be £66,593; being £1 5s. 3¼d. per stove. The total annual charges against the Stoves Department in the revenue account, including rents of shops, attendance, cartage, fixing, repairs, &c., amounted last year to £13,598, compared with £11,479 in the preceding year and £6968 in 1903-4. It had to be remembered, however, that all the expense incurred in connection with advertising and educating the public was charged against this department, which seemed scarcely fair. The hiring rate for cooking-stoves in Glasgow was fixed on a basis of 15 per cent. on the cost of each stove. In some places, stoves were provided and fitted free of charge. It was not improbable that a similar system would be advocated for Glasgow—at all events, it seemed worth the serious consideration of the Corporation. It might be inferred that the system of free service proved profitable in the places where it was in vogue; the profit obtained from this class of gas consumption more than repaying the cost of providing, fitting, and maintaining the cookers. The revenue from the hire of stoves in Glasgow last year was £9069, or 3s. 5¼d. per stove. It was estimated that the gas consumed through appliances let on hire amounted to 550 million cubic feet per annum. This was less than an average of ¾d. worth of gas per cooker per day, leaving the small griller out of account altogether. This quantity, taking the cost of supplying gas at even 1s. 4d. per 1000 cubic feet, gave, at the present selling price of 2s., a profit to the department of over £18, which not only cleared off any apparent deficit on the stoves, but assisted materially in reducing the price of gas for other purposes. Apart from the purer atmosphere which would inevitably follow the general use of gas for heating and cooking purposes, it seemed clear, the writer concluded, that greater encouragement by the Corporation in the use of such appliances would prove highly lucrative to the department. Some critics objected to such enterprise on the part of the Corporation, on the ground that it invaded the sphere of the private trader. It would seem, however, that the use of gas as a fuel could only be adequately developed if the apparatus were supplied on favourable terms to the consumer, by hire or hire purchase. This was the experience of other municipalities. A careful census showed that, in the area supplied by the Glasgow Corporation, only 4000 cooking-stoves were owned by users, while 52,000 were on hire. These figures were significant of public feeling on the question; and also suggested the lines on which the use of gas-stoves was to be developed. A similar principle applied to the supply of heating apparatus would, there was no doubt, result in a great increase of gas-fires. While there had been a gratifying increase in the use of cooking-stoves, there were in the area of the Gas Department only 19,000 gas-fires and heating-stoves. Many householders were desirous of installing gas-fires; and it had been ascertained that the principal reasons which deterred them from doing so were: (1) The fear that the type of appliance might be found unsuitable after purchase; and (2), the initial cost. The adoption of the hire-purchase system would obviate these difficulties. The system of smokeless heating had been greatly improved of late; and it was admittedly one of the most practical and economical methods of dealing with the problem of air pollution. In gas undertakings where heaters were provided on the hire-purchase system, it was the rule to spread the payments over three or four years. It was estimated that gas-fires might be installed in Glasgow for rentals varying from 2s. 6d. to 4s. per quarter.

The question of the filling up of the vacancy in the managership of the Dumfries Corporation gas-works, caused by the appointment to Stirling of Mr. John Smith, who was Joint Manager with Mr. S. Dickie, came before a special private meeting of the Town Council on Tuesday. Bailie Macaulay, in the Council, moved, as he had done in Committee, that Mr. Dickie be appointed sole Manager. Mr. Newby seconded. Provost Lennox moved that the Council take steps to secure

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the services of a competent gas engineer as manager. Bailie Smart seconded. The question of what was a competent gas engineer was asked; and it was replied that he would be a gentleman who would be capable of designing gas-works and of preparing the plans. Judge Thomson, the Convener of the Gas Committee, asserted that it was not possible to secure such a man for Dumfries. The counter-argument was used that a town possessed of valuable gas-works, in which a capital of £100,000 is invested, ought to employ a capable engineer. Bailie Macaulay expressed the opinion that they would be able to get, for a weekly wage of £2 10s., a practical man good enough for their purpose. Bailie Macaulay's motion was carried by 16 votes to six. The resolution will be reported to the Town Council at their first public meeting. Provost Lennox intimated that he would then renew his opposition to the resolution. It is understood that, in the event of Mr. Dickie being appointed Manager, there will be no change made in the salary.

The annual meeting of the Fauldhouse Gas Company was held on Thursday. Mr. W. Prentice, the Chairman, who presided, said that the Directors, instead of paying a dividend, had preferred to spend the money earned in making connections, as they believed that this was the soundest policy to adopt in order to increase the consumption of gas. The prospects of the Company were good, and he had no doubt that the results of the current year would allow of their paying a dividend. Mr. T. Wilson, Gas Engineer, Coatbridge, was of opinion that the Directors could easily have paid a 4 per cent. dividend if they had carried forward the share of the preliminary expenses which they had written off. The report of the Directors was adopted.

The expenditure for the past financial year in the Gas Department of the Greenock Corporation was £34,383, and the income £50,884. The gross surplus is thus £16,501. After deducting interest, sinking fund, and depreciation, the net balance is £7198. It has been decided to wipe out a deficit of £1963 on the previous year's working, which will leave a surplus of £5235 for disposal at a special meeting of the Gas Committee.

The first ordinary general meeting of the Cardenden Gas Company, Limited, was held on Tuesday. Mr. R. A. Muir, who presided, explained that the Directors had laid down plant which would be capable of supplying gas to a much larger population than they had. Their balance-sheet was quite satisfactory. The gas-works had been open for eight months, and they had a profit of £203. A dividend at the rate of 2½ per cent. was recommended and agreed to. The Directors are considering the subject of the extension of the gas supply to Kinglassie.

In last week's "Notes," I mentioned the case of the man named Murdoch Barnett, of St. Mary Street, Arbroath, on whose behalf a claim was made against the Corporation of Arbroath for compensation in respect of injury sustained through an escape of gas in his dwelling-house on June 14. The claim was for £37 13s.; and the Town Council offered £15 and part expenses, which, it would appear, had been accepted. It is announced that Barnett died on Monday morning. His death is attributed to the effects of gas poisoning.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 20.

Sulphate of Ammonia.

The market has continued strong throughout the week, and available supplies have again been readily taken up at advancing prices. The fact of the keen demand having come along at the time of minimum production has no doubt accentuated the firmness of the situation, and at the close values have reached £12 1s. 3d. to £12 2s. 6d. per ton f.o.b. Hull, £12 2s. 6d. to £12 3s. 9d. per ton f.o.b. Liverpool, and £12 5s. to £12 6s. 3d. per ton f.o.b. Leith. Buyers have shown more disposition to operate in the forward position at the present level of prices, and sales are reported for October, 1910, to March, 1911, delivery at £12 5s. per ton f.o.b. Leith. Makers are now quoting £12 7s. 6d. per ton for delivery over the first six months of next year; but no business has transpired at this figure.

Nitrate of Soda.

This article meets with good inquiry, and holders are very firm at 9s. 3d. per cwt. for ordinary and 9s. 6d. for 96 per cent. quality, spot.

LONDON, *Aug.* 22.

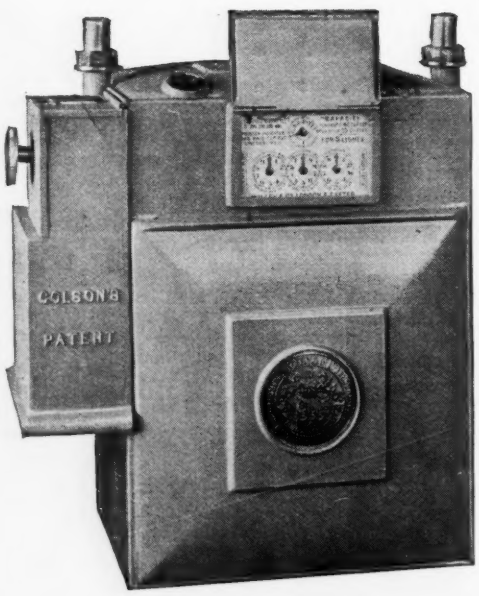
Tar Products.

The markets for tar products have been steady during the past week. In pitch, there has been a little more inquiry, and prices have improved still further. Creosote is steady, and there is a fair amount of fresh inquiry. Prices remain about the same for benzols, and in many cases manufacturers are asking improved prices for forward delivery. In solvent naphtha, there is a fair amount of inquiry for prompt and forward delivery, and prices are being maintained. Crude carbolic is very dull, and new business is hard to negotiate.

The average values during the week were: Tar, 18s. to 22s., *ex* works. Pitch, London, 36s. 6d. to 37s.; east coast, 36s. to 36s. 6d.; west coast, 35s. to 35s. 6d. f.a.s. Mersey ports. Benzol, 90 per cent., casks included, London, 6¾d. to 7¼d.; North, 6d. to 6½d.; 50-90 per cent., casks included, London, 7⅜d.; North, 7d. to 7¼d. Toluol, casks included, London, 10d.; North, 9d. to 9¼d. Crude naphtha, in bulk, London, 3¾d. to 4d.; North, 3½d. to 3⅝d.; solvent naphtha, casks included, London, 1s. 2d. to 1s. 3d.; North, 1s. 2d. to 1s. 3d.; heavy naphtha, casks included, London, 11d. to 1s.; North, 10d. to 11d. Creosote, in bulk, London, 2¼d. to 2⅜d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. to 2½d. Carbolic acid, 60 per cent., casks included, west coast, 1s.; east coast, 1s. c½d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1½d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market has remained very firm, but there has been no further substantial increase in prices. Actual Beckton make is quoted at £11 15s. to £11 16s. 3d.; outside London makes, £11 8s. 9d. to £11 10s.; Hull, £12 to £12 1s. 3d.; Liverpool, £12 to £12 1s. 3d.; Leith, £12 5s.; and Middlesbrough, £12 to £12 1s. 3d.



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COAL TRADE REPORTS.

Northern Coal Trade.

There has been a steady but not very brisk trade in coal during the last few days. The shipments have been fair, and the output good; but for forward orders some competition is shown. In the steam coal trade, the demand is on the whole good. Best Northumbrians are about 10s. per ton f.o.b., second-class steams 9s., and steam smalls from 5s. 6d. to about 6s. 9d.—the demand for the latter kind being fully an average. In the gas coal trade, the demand is now heavier, both for home use and for export; but the production is full, and it meets the request well, though some of the best-known collieries have their immediate output well taken up. Prices of Durham gas coals vary from 9s. to 9s. 3d. per ton f.o.b. for second-class descriptions to 9s. 10½d. to 10s. for best sorts. Special "Wear" gas coals are quoted from 10s. 3d. to 10s. 6d. Sales of good qualities have been made for delivery over next year at Genoa, at about 16s. to 16s. 1½d. per ton, delivered at the Italian port named. The tenders have been sent in, and are now under consideration, for about 30,000 tons to 40,000 tons, for Palermo. Coke is rather steadier; and gas coke is a little more plentiful as the make increases. Good gas coke is quoted from 15s. 6d. to 15s. 9d. per ton f.o.b. in the Tyne; but the exports seem slightly heavier.

Scotch Coal Trade.

Trade shows no signs of improvement. For shipment, ell has been in better demand. Other sorts, and particularly splint, are being disposed of with difficulty; prices being easier. Steam coal is very plentiful. The prices now quoted are: Ell, 8s. 9d. to 10s. 3d. per ton f.o.b. Glasgow; splint, 9s. 3d. to 9s. 6d.; and steam, 9s. to 9s. 3d. The shipments for the week amounted to 346,105 tons—an increase of 15,196 tons upon the previous week, and of 25,988 tons upon the corresponding week of last year. For the year to date, the total shipments have been 9,958,161 tons—an increase of 928,287 tons upon the corresponding period.

Public Lighting of Church Stretton.—The Church Stretton Gas Company, Limited, have again secured the contract for the public street lighting for the ensuing three years. The Electricity Company were asked to tender for it; but they failed to do so.

Reductions in Price.—The Directors of the Leighton Buzzard Gas Company have decided to reduce the price of gas 2d. per 1000 cubic feet; making it 3s. 1d. to ordinary consumers, and 2s. 1d. to users of gas for motive power. At the meeting of the Normanton Gas Company on the 13th inst., the Chairman announced a reduction of 1d. per 1000 cubic feet in the price of gas as from the end of the current quarter. As from the 1st ult., the price of gas in Liverpool has been reduced by 1d. per 1000 cubic feet; and at the beginning of next month the charge to the users of prepayment meters will be lowered to the extent of twice this amount.

Hoylake and West Kirby Gas and Water Company.

The report of the Directors and the accounts for the year ending June 30 (which were submitted at the thirty-third ordinary general meeting of the Company) show that the balance at the credit of profit and loss, after payment of the dividends in respect of the year to June, 1909, was £2028, to which has to be added the net revenue for the past twelve months, £7904—making a total of £9932. Deducting the interim dividend paid in January (£2600), there was available a sum of £7322. From this, the Board recommended the payment of the following dividends: 6 per cent. on the "A" gas original capital; 4½ per cent. on the "B" gas additional capital; 6 per cent. on the "A" water original capital; and 4½ per cent. on the "B" water additional capital. These absorbed £3899, and left a balance of £3433. After transferring £410 to the water back-dividend reserve, £650 to the gas, and £150 to the water contingency and plant renewal fund, and adding £167 to the gas reserve fund, there was left a sum of £2056 to carry forward. The dividend scheme, together with the interim dividend paid in January, made a total distribution, less income-tax, for the year of 10 and 7 per cent. on the "A" and "B" capitals respectively. The gas reserve fund stands at £1731. The quantity of gas supplied last year to private consumers and the public lamps was 58,367,999 cubic feet. The price of gas during the period under review was 3s. 6d. per 1000 cubic feet, less varying discounts; while the charge to users of prepayment meters was 4s. 2d.

Voelker Lighting Corporation, Limited.—The annual meeting of shareholders was held last Friday at the Wandsworth works, when the highly satisfactory report and statement of accounts referred to in our last issue were unanimously adopted. The shareholders congratulated the management upon the excellent results obtained, especially in view of the constant uphill work it has been to combat almost unprecedented competition—showing that an "all British made" mantle is appreciated by gas engineers throughout the country.

New Joint-Stock Companies Registered.—The Float Turguand Gas Detector Company, Limited, has been registered with a capital of £5000, in £1 shares, to adopt an agreement with F. J. Turguand, W. E. Gray, and C. Weld-Blundell, for the acquisition of an invention for improvements in gas detecting apparatus, and patents granted in respect thereof throughout the world, and to develop and turn them to account. The British Water-Main and Sewer Company, Limited, has been formed with a capital of £2000, in £1 shares (500 being 7% per cent. preference), to carry on the business of cleaning out incrustations from water-mains and deposits from sewers, pipes, or tubes of any kind, &c., and to acquire the business carried on by the British Pipe-Cleaning Company at Hipperholme, Yorks, and to adopt an agreement with W. Glossop. There was registered in Edinburgh last week the Victor Gas-Machine Company, a private Company with a capital of £2000, in £1 shares, the purpose of which is to manufacture, sell, and supply light, and to carry on business in connection with air gas, petrol gas, or gas manufactured from petrol, gasolene, or other spirit.

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Opening of the Cardiff Gas-Works Recreation Ground.

With the view of providing the workmen with the means of healthy athletic exercise, the Directors of the Cardiff Gas Company a short time ago gave them a piece of ground abutting upon the Grange Gas-Works; and it was opened on Saturday, the 13th inst., when a programme of sports was gone through in the presence of a large gathering, including the Chairman (Dr. Taylor), who started the first race, and two of the Directors (Colonel Oakden Fisher and Mr. C. E. Dovey). The ground is an ideal one for the purpose, having a depth of about 10 feet of cinder; and on the opening day its condition was almost perfect, notwithstanding the fact that its preparation had occupied only seven weeks. This was due to the assiduous efforts of the Company's Engineer (Mr. H. D. Madden), the Superintendent (Mr. A. E. Williams), the Assistant-Superintendent (Mr. C. H. Carder), the Secretary of the sports (Mr. A. R. Taverner), and a willing band of workmen. The athletic club is an offshoot of the air-rifle clubs and baseball club, in which Mr. Madden has taken a great interest; and it is intended to form other clubs, to include football, harriers, bowls, and lawn tennis. The meeting attracted a large entry, including several well-known men in the running world. Prizes to the value of £30 were offered; and at the conclusion of the sports they were presented by Mrs. Madden, to whom and to the Directors a vote of thanks was proposed by Mr. Taverner and heartily accorded. During the afternoon, the proceedings were enlivened by selections of music given by the Loudoun Brass Band, under the conductorship of Mr. A. J. Moore. The success of the Company's Workmen's Institute and the athletic and other clubs is due in a large measure to the hearty support and encouragement they receive from the General Manager and Secretary (Mr. George Clarry), who was unavoidably prevented from being present at the opening of the new ground, on account of being away on his holidays.

East Worcestershire Water Company.—In the six months ended the 30th of June, the average quantity of water pumped daily by this Company was 1,293,451 gallons. The net profit of the Company was £2362, and the disposable balance is £3249, which it is proposed to appropriate as follows: To pay a dividend for the half year at the rate of 5 per cent. per annum, free of income-tax, £1831; to provide depreciation on buildings, £100; ditto on machinery and mains, £500; to carry forward the balance, £818.

Bonus for Truro Water Shareholders.—The accounts presented at the half-yearly meeting of the Truro Water Company showed that the balance to the credit of profit and loss account was £2174. The Directors recommended that a dividend of 5 per cent. should be paid, and that the balance of £1774 should be carried forward. Mr. A. C. P. Willyams, the Chairman of the Company, announced, however, that the Directors had been reconsidering the matter; and, in view of the balance in hand, they thought they would be doing right in granting the shareholders a bonus of 5s. per share. He explained that they had already given bonuses to the extent of £2 10s. per share.

Fatality Caused by a Gas-Ring.—An inquest was held at Battersea last Friday on the body of Mrs. Mabel Gertrude Jones, aged 32, of Kelmscott Road, Wandsworth Common, who died on Wednesday at the Bolingbroke Hospital. The evidence showed that Mrs. Jones, who was wearing a muslin dress, was making tea, and boiled the kettle on a gas-ring. Her dress became ignited, and she was quickly enveloped in flame. She ran across the passage with her dress on fire, and a man who was passing by in the street tried to extinguish the flames with a rug; but Mrs. Jones was so badly burned that she died from shock. A verdict of "Accidental death" was returned.

Failure of the Electric Light at Southend.—On the night of Saturday, the 13th inst., when Southend was crowded with people and business was at its best, the electric light failed, and a large portion of the town was in semi-darkness. Shopkeepers who had not abandoned gas as an illuminant, at once brought it into use; but those who had given it up had to resort to candles and other means of obtaining light. At places of amusement, the entertainments had to be stopped till the gas could be lighted. On the Westcliff Parade, where the band of the Black Watch was performing, all the lights went out. After the lapse of a quarter-of-an-hour, the light was restored; but a second failure (fortunately only for a few seconds) occurred shortly afterwards.

South Essex Water Company.—In moving the adoption of the report at the ordinary general meeting of the Company last Tuesday, Mr. Courtenay C. S. Fooks said the accounts showed the growing prosperity of the undertaking. For the past half year, the gross revenue was £27,430, or £163 more than for the corresponding period of 1909. With regard to the expenditure, the actual pumping charges were less; but the total expenses were more by about £110, due partly to an increase in rates and taxes. It was recommended that 5 per cent., less income-tax, should be paid for the half year on the preference stock; and that dividends, less income-tax, should be paid upon the ordinary stocks 1861, 1882, and 1901, at the rates of £9 15s., £6 16s. 6d., and £4 17s. 6d. per annum respectively. The report was adopted.

Frimley and Farnborough Water Supply.—At the ordinary general meeting of the Frimley and Farnborough District Water Company on the 13th inst., the Directors reported that in the half year ended the 30th of June the trunk and service mains had been extended about four miles, and the third new subsiding reservoir completed. The floor and walls of the high-level reservoir at South Warnborough were finished, and the roof was in course of construction. Two large softening tanks at Greywell, Hants, were in a forward state; and the building of the engine house had been commenced. The gas plant and pumps for this station were ready for delivery and erection. The Directors hoped that the whole of these works would be completed by the end of this year, and the new sources of supply made available. The accounts accompanying the report showed that the revenue balance was £5284. After paying the interest due upon the debentures, &c., and adding the balance brought forward, there was produced a sum of £13,667, out of which the Directors recommended the payment of a dividend at the rate of 7 per cent. per annum, carrying forward £9920. This was agreed to.

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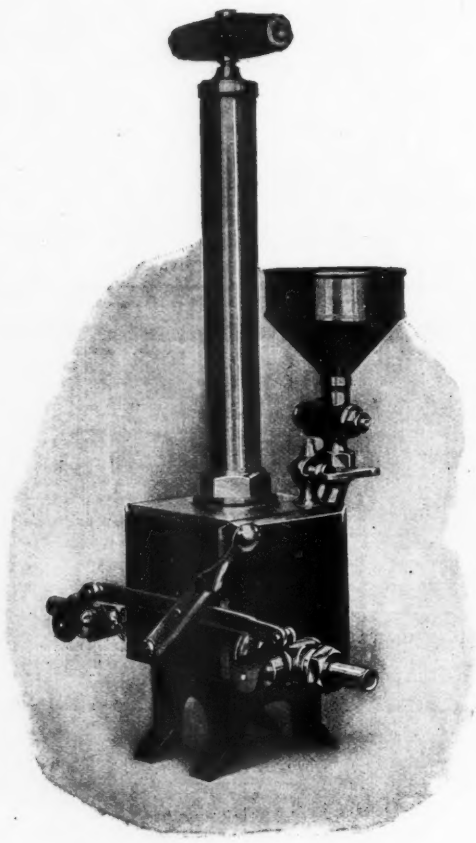

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Aberystwyth Water Supply.—At the meeting of the Aberystwyth Town Council last Tuesday, the Town Clerk (Mr. A. J. Hughes) read a letter from the Local Government Board with reference to the proposed new service reservoir which, at a cost of £7300, it is intended to construct on the outskirts of the borough. The Board pointed out that unless the objections raised to the intended work were withdrawn, there must be a second inquiry on the spot by one of the Inspectors. The Town Clerk said he had written to Dr. Harries, who had made the objections referred to, asking him for particulars of his alternative scheme. To this Dr. Harries replied that he was having plans prepared, and hoped to be very shortly in a position to discuss the whole question with the Council.

Mitcham and Wimbledon Gas Company.—The accounts which the Directors of this Company will submit at the half-yearly general meeting next Tuesday show that, after providing for interest charges and carrying £900 to the insurance fund, the sum available for distribution, including the amount brought forward, is £18,180; and in their report they express their pleasure in recommending the payment of the further increased dividend at the rate of 5½ per cent. per annum (less income-tax)—the full statutory rate to which the proprietors are entitled under the sliding-scale, consequent upon the reduction of 2d. per 1000 cubic feet in the price of gas from January last. There was a substantial increase in the sales of gas in the six months covered by the report, which, having regard to the comparatively mild weather experienced early in the year, the Directors consider highly satisfactory.

Prepayment Meter Charges for Gas at Bolton.—At last Friday's meeting of the Bolton Corporation Gas Committee, a deputation from the Local Trades Council attended and were heard with reference to the charges now made for gas to consumers by prepayment meter. Mr. France, who at the last meeting of the Town Council unsuccessfully moved that the charge to penny-in-the slot meter consumers be at the rate of 1d. for 30 cubic feet, instead of 25 cubic feet as at present, was also heard. The members of the deputation and Mr. France urged that it was unfair that consumers by prepayment meter should be charged at the rate of 3s. 6d. per 1000 cubic feet, while those using ordinary meters paid only 2s. 6d., particularly seeing that the former were, as a rule, the poorer class of citizens. After a long discussion, the Committee decided to defer the matter until the next meeting.

West Ham Electricity Loans.—Last Wednesday, a letter was received by the Town Clerk of West Ham from the Local Government Board, giving sanction to the Corporation's application for loans to the extent of £118,525. This covers two applications—one of 1908 and the other of May last. The original amount of the former was £74,000; and this has been reduced to £67,025, owing to sums put aside by the Corporation for repayment. The second application was originally for £53,500; but it was reduced by the Corporation to £51,500 at the inquiry held last month, when Mr. Robb, who appeared for the India Rubber and Gutta Percha Company, of Silvertown, made an application for an adjournment. The sanction of the Board to these loans will simplify the Council's task in considering the situation arising from the recent decision given in the High Court on the action brought against them by the Company.

Barnet District Gas and Water Company.—At the half-yearly general meeting of the Company next Monday, the Directors will report that the balance standing to the credit of the profit and loss account amounts to £29,079, out of which they will recommend the declaration of a dividend, less income-tax, for the six months ended the 30th of June at the rates of 7½ per cent. per annum on the "A" and "C" stocks, 6½ per cent. per annum on the "B" stock, and 5½ per cent. per annum on the "D" capital gas and water stocks. The Directors express their pleasure in reporting, with respect to the injunction obtained against the sinking by the Company of a well at Tyttenhanger, that, in the final appeal to the House of Lords, the decision of the Court of Appeal was upheld, and judgment given entirely in favour of the Company with costs. The work is proceeding. The Engineer and Manager (Mr. F. J. Bancroft, B.Sc., M.Inst.C.E.) reports that the works are in good repair and condition.

APPLICATIONS FOR LETTERS PATENT.

18,635.—Ingram, J., "Stop valve." Aug. 8.
18,645.—Bellamy, N. F., "Pipe and joint." Aug. 8.
18,649.—Walton, C. & J. B., "Reciprocating conveyors and screens." Aug. 8.
18,689.—Krone, F., and Kahle, E., "Inverted lamps." Aug. 8.
18,698.—Société l'Air Liquide (Société Anonyme pour l'Etude et l'Exploitation des Procédés Georges Claude), "Desiccation of air and other gases." Aug. 8.
18,703.—Galbraith, H., and Waite, J. N., "Liquid meters." Aug. 8.
18,710.—Dunn, J., "Pipe-grips." Aug. 9.
18,735.—Williams, J., "Air carburetting apparatus." Aug. 9.
18,836.—Jaeger, C. H., "Rarefying and compressing air and gases." Aug. 10.
18,872.—Buwalda, C. W., "Turning on and off the supply of gas to gas-burners." Aug. 10.
18,878.—Milne, J., "Governors for gas." Aug. 11.
18,918.—Deutsche Gasglühlicht Akt.-Ges. (Auergesellschaft), "Lighting and extinguishing gas-lamps." Aug. 11.
18,922.—Hiby, W., "Charging coke-ovens." Aug. 11.
18,959.—Sullivan, P., "Fire-lighter with the aid of gas." Aug. 12.
18,967.—Aird, K., "Gas-fires." Aug. 12.
19,012.—Warren, C. H., "Connecting delivery pipes and water and gas mains while under pressure." Aug. 12.
19,022.—Mathot, R. E., "Regeneration gas-producers." Aug. 12.
19,039.—Fabry, R., "Extracting water from saturated solutions of ammonium sulphate." Aug. 13.
19,073.—Skriwan, E., "Incandescent mantles." Aug. 13.
19,074.—Lowe, F. R., and Ely, B., "Treatment and purification of ammoniacal liquors and of waste ammoniacal liquors." Aug. 13.

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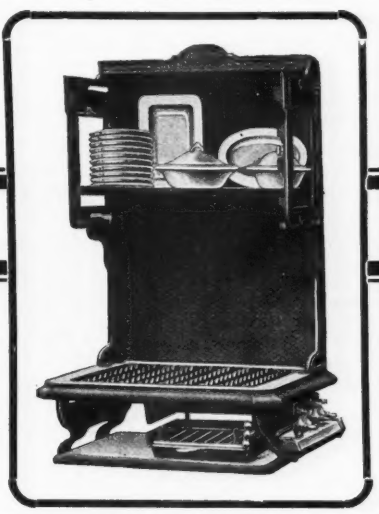

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129, HIGH HOLBORN, LONDON.

We have received from Messrs. James Milne and Son, Limited, of Edinburgh, one of the metal-mounted and varnished wall sheets which they are sending out to plumbers, showing designs of coronas, pendants, and brackets suitable for churches and halls, in inverted gas-fittings. The designs are all priced in various finishes.

Gas managers who are contemplating repairs to their retort-settings in view of the coming winter may be interested to learn that George K. Harrison, Limited, of Stourbridge, have just issued a new illustrated catalogue of gas-retorts, fire-bricks, lumps, tiles, &c., the contents of which occupy 68 oblong pages. A few useful notes on ordering gas-retorts will be found on p. 20, and some remarks on regenerative retort settings, by Winstanley and Co., on pp. 22-24.

In the last number of the "JOURNAL" (p. 452), attention was called to a new collapsible mantle, the "Sirrah," which has been introduced by Messrs. J. W. May and Co., of No. 34, Cock Lane, Snow Hill, E.C. The prices of these mantles and of the others sold by the firm will be found in their general catalogue and price list for the season 1910-11, which contains a great variety of burners and burner accessories, glassware, stoves, &c. A special feature of the catalogue is that all the prices quoted are net.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

WATER SECRETARY AND MANAGER. Tynemouth Water Department. Applications by Aug. 31.
ASSISTANT-MANAGER. Coatbridge Gas Company. Applications by Sept. 1.
DRAUGHTSMEN. West's Gas Improvement Company, Manchester.
DRAUGHTSMEN. No. 5268.
REPRESENTATIVE. "Gas-Works," c/o Streets, Cornhill.
MAINTENANCE INSPECTOR. Grantham Gas Company.

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STAINES AND EGHAM GAS COMPANY. Tenders by Sept. 9.

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RHONDDA GAS AND WATER DEPARTMENT. Tenders by Sept. 2.

Station Meter, &c.

RHONDDA GAS AND WATER DEPARTMENT. Tenders by Sept. 2.

Tar and Liquor.

STAINES AND EGHAM GAS COMPANY. Tenders by Sept. 9.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatev is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, SUNDERLAND, and WAKEFIELD.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Bensols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.
86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
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AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

JOHN W. LEITCH AND COMPANY,
MILNSBRIDGE CHEMICAL WORKS,
near HUDDERSFIELD.
The Manufacture of
PURE BENZOL FOR GAS ENRICHMENT
a speciality.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 6848.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
Communications should be addressed to Underwood House, PAISLEY.

TAR WANTED.
Telephone: Central Manchester, 7009.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
John Radcliffe, Chemical Engineer, East Barnet.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agent, F. J. Nicol, Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Dorig," Newcastle-on-Tyne. National Telephone No. 2497.

AMMONIA.
Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "Dacolight London." Telephone: 2336 Holborn.

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PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

GAS OILS.
MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, Exchange Street, Manchester, and 11, Old Hall Street, Liverpool.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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IT is Worth Your While to Buy Direct. The RELIANCE LUBRICATING OIL COMPANY supply the best value in NON-CORROSIVE LUBRICANTS—viz., Motor Waggon Oil, 1s.; Motor Car Oil, 2s.; Engine, Cylinder, and Machinery Oils, 1s.; Axle Oil, 10½d.; Exhauster Oil, 10d.; Special Cylinder Oil, 1s. 4d.; 650 T Cylinder, 2s.; Special Engine Oil, 1s. 4d.; Gas Engine and Oil Engine Oil, 1s. 6d.; Refrigerator, 1s. 9d.; Renown Engine Oil, 11½d.; and Astral Disinfectant, 2s. 6d. per gallon. Barrels free, carriage paid. Solidified Oil, 25s. cwt.
The Reliance Lubricating Oil Company, 19 & 20, Water Lane, Tower Street, London, E.C.

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

GAS TAR wanted,
Brotherton and Co., Ltd., Tar Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

GAS Engineer and Manager (Age 32), Experience over 17 Years in Erecting and Managing Gas-Works, desires APPOINTMENT Abroad. Would go out Erecting or Managing.
First-Class References, and any further Particulars from No. 5275, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Position as Engineer, MANAGER, or HEAD DRAUGHTSMAN to Gas or Water Works or Contracting Engineers. Thoroughly Competent. Energetic. Good References. Age 35 Years. Moderate Salary. No objection to going Abroad.
Address No. 5277, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, Draughtsmen accustomed to Constructional and Mechanical Engineering.
Apply, by letter, stating Age, Experience and Salary required, to West's Gas Improvement Company, Ltd., Albion Iron-Works, Miles Platting, Manchester.

THE Coatbridge Gas Company require an ASSISTANT-MANAGER.
Applications, stating Experience, References, and Salary expected, to be in the hands of the Secretary not later than the 1st of September current.

WANTED, immediately, Two or Three DRAUGHTSMEN, fully Experienced in the Design of Modern Gas Plant.
Apply, by letter, Stating Age, Qualifications, and Salary required, to No. 5268, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

REPRESENTATIVE required to introduce and push important article used in all Gas-Works. Must have Good Connections and be good Salesman.
Please write, stating Qualifications, District, and References, to: "Gas-Works," care of Streets, 30, Cornhill, E.C.

WANTED by a Firm of Ironfounders and Chemical Engineers, with Established Trade among Chemical Manufacturers, to undertake the Sole Rights of Making and Selling Chemical Specialities in Great Britain.
Apply No. 5262, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE Grantham Gas Company Require the Services of a Smart, Capable, young fellow as MAINTENANCE INSPECTOR, to devote the Whole of his Time to the Maintenance of Incandescent Burners, Fittings, &c. None need Apply save those who have had similar Experience.
Applications, stating Age, Experience, and Wages required, to R. G. Shadbolt, Gas Office, Grantham.

COUNTY BOROUGH OF TYNEMOUTH.
(Water Department.)

THE Corporation require a Water SECRETARY and MANAGER possessing Experience in the Office of a Water Department and having Engineering Qualifications as well as a Commercial Training.
Salary, £250 per Annum, for Two Years, rising thereafter by Two Annual Increments of £25 to a maximum of £300 per Annum.
Canvassing prohibited.
Applications, stating Age, Experience, and Qualifications, to be delivered to the undersigned before noon on the 31st of August, 1910.
A List of Duties may be obtained from the undersigned.

E. B. Sharpley,
Town Clerk.

Town Hall Tynemouth,
August, 1910.

GASHOLDERS—16 ft., 24 ft., 26 ft., and 45 ft. Diameter GASHOLDERS, Cheap for immediate Sale. Re-erected in either Brick or New Steel Tanks Complete to Plan and Specification. Can be seen Temporarily Erected at our Works.
Firth Blakeleys, Thornhill, Dewsbury.

FOR DISPOSAL—Brick Plant complete. Including 400,000 Place and Hard Stock BRICKS, 15s. to 25s. per Thousand f.o.r. Maidstone. 12-H.P. Portable STEAM-ENGINE by Marshall, of Gainsborough, insured 90 lbs. Steam by National, nearly as good as when delivered from Workshops, £140. High-Pressure BOILER, new, insured 200 lbs. Steam. Suitable for 2-Ton Lorry, £20. 4-H.P. Horizontal STEAM-ENGINE, £5. 5-H.P. ditto, £6. Cheap 8-H.P. Portable STEAM-ENGINE £25. Offers solicited.
Full Particulars on Application to Wm. Johnson, Junr., New Hythe, Larkfield, Kent,

URBAN DISTRICT COUNCIL OF OSWALDTWISTLE.
TENDERS FOR GAS COAL.

THE above Council invite Tenders for the Supply of the whole or part of 3000 Tons of NUTS or UNSCREENED COAL, to be delivered during the Year ending Sept. 30, 1911.
Conditions and Form of Tender may be obtained on Application to the Manager, Mr. J. H. Davies, Gas-Works, Church, Lancashire.
Sealed Tenders, endorsed "Tender for Coal," must be delivered to the undersigned not later than Twelve o'clock noon on Thursday, the 1st prox.
The Council do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide the Contract in any manner they may think fit.

B. T. Westwell,
Clerk to the Council.

Town Hall, Oswaldtwistle,
Aug. 15, 1910.

STAINES AND EGHAM DISTRICT GAS AND COKE COMPANY, LIMITED.
LIME.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of about 130 Tons of LIME, suitable for Gas Purification, during the Twelve Months ending Sept. 30, 1911.
Forms of Tender may be had on Application.
TAR AND AMMONIACAL LIQUOR.
TENDERS are invited also for the Purchase of the Surplus COAL TAR, CARBURETTED WATER-GAS TAR, AND AMMONIACAL LIQUOR, for One Year commencing on the 1st of October next.
Coal Tar, at per Gallon, pumped into Buyer's Tank-Barges alongside the Company's Thames-side Wharf at Egham.
Carburetted Water-Gas Tar, at per Gallon, pumped into Buyer's Casks and loaded on to Buyer's Barge alongside Wharf.
Ammoniacal Liquor, at per 1000 Gallons, at 8-oz., 9-oz., and 10-oz. Twaddel, pumped into Buyer's Barge, as before stated.
The Directors reserve the right to accept any Tender for Tar and Liquor separately.
The highest or any Tender not necessarily accepted.
Tenders, endorsed "Lime," "Tar," and "Liquor" respectively, and addressed to the Directors, must be delivered not later than Friday, the 9th of September next.

Geo. H. Sayers,
Secretary.

The Causeway, Staines,
Aug. 20, 1910.

RHONDDA URBAN DISTRICT COUNCIL.
(Gas and Water Department.)

THE Council are prepared to receive TENDERS for the following:
Contract No. 50.—For ONE GAS STATION METER to pass 60,000 Cubic Feet of Gas per Hour at the Porth Gas-Works.
Contract No. 51.—For Building ONE BED AND SETTING WITH EIGHT INCLINED RETORTS on the Tubular Regenerator System in existing House at the Porth Gas-Works.
Specification and Form of Tender for Contract No. 50 can be obtained; while Specification and Plans for Contract No. 51 must be inspected at the Office of the Engineer and Manager, Mr. Octavius Thomas, Gas and Water Offices, Pentre, Rhondda, upon the payment of One Guinea in each case, which will, after the Council have entered into a Contract upon the Tenders received, be returned to the Tenderer, provided that he shall have sent in a *bond-fide* Tender, and shall not have withdrawn same.
The Contractor will be required to pay the Standard Rate of Wages recognized in the District.
Tenders to be addressed to the Chairman of the Gas and Water Committee, endorsed "Contract No. 50 or 51," as the case may be, and delivered at my Office not later than Ten a.m. on Friday, Sept. 2 next.
The Council do not bind themselves to accept the lowest or any Tender.

Walter P. Nicholas,
Clerk of the Council.

Public Offices, Pentre,
Rhondda, Aug. 17, 1910.

THE Owner of British Patent No. 21,808, of 1907, entitled "IMPROVEMENTS IN COKING, OR DISTILLING, COAL FOR THE MANUFACTURE OF COKE AND PRODUCTION OF GAS," granted to S. B. Sheldon, is desirous of DISPOSING of the Patent or Entering into a WORKING ARRANGEMENT, under LICENCE, with Firms likely to be interested in the same. In the alternative, the Owner would be open to consider Proposals to MANUFACTURE THE APPARATUS, and to carry out the process to fill any requirements of the Market in Great Britain, on Terms to be arranged.
The Patent covers an Invention interesting to Manufacturers of Gas and Coke and Gas Producers.
Detailed Information as to the invention will be found in the Patent Specification, of which a copy will be supplied to any interested party on request.
Full Particulars can be obtained from, and Offers made (for transmission to the Owner) to, Marks and Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,
BRETTELL'S ESTATE,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

JOHN HALL & CO. OF STOURBRIDGE,
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

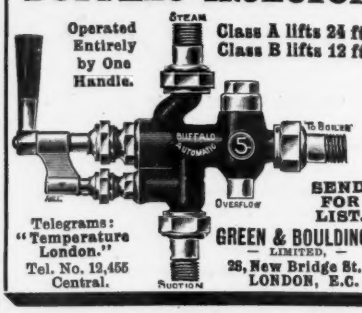
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large Stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

'BUFFALO' INJECTOR
Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.


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Telegrams: "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, LIMITED,
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SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
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STEEL OF ALL DESCRIPTIONS.
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90, CANNON STREET, E.C.

A. E. PODMORE & CO.,
Gas Lighting Engineers and Contractors,
34, Charles St., Hatton Garden, LONDON, E.C.
Telegrams: "PROMEROPE, LONDON."
Telephone No.: 6600 CENTRAL. A.B.C. Code, 5th Edition used.

SEASON, 1910-11.
NEW MODEL
INVERTED LAMP.
Every Part Interchangeable.
Each Part Renewable.
ALL COPPER.
Air and Gas Adjustment Outside of Lamp.
With Separate Tap to each Burner or One Control Tap on Top of Lamp.
Highest possible Candle Power with Low Pressure Gas.
Ideal Lamp for Gas Companies.
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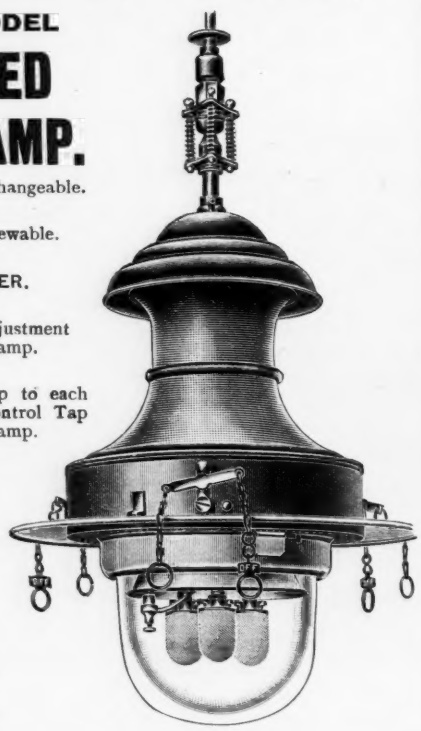

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WILSON CARTER & PEARSON,
LIMITED,
Gas, Steam, and other Fuel for Home and Export.
GAS COKE CONTRACTORS.
Chief Offices: **50, NEW STREET, BIRMINGHAM.**
Telegraphic Address: "CARTER PEARSON, BIRMINGHAM." Telephone Nos.: CENTRAL 3013 and 3014.

DON'T BUY GAS METERS OR GOVERNORS
UNLESS THEY ARE MADE BY
MILNE'S
Milton House Works, EDINBURGH; Midland Meter Works, LEEDS; 111, St. Vincent Street, GLASGOW; 59, Farringdon Road, LONDON.

GRAETZIN LIGHT

Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

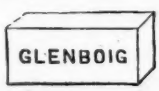
From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

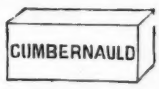
THE GLENBOIG UNION FIRE-CLAY CO., LTD.

GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

TRADE MARKS.





The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.

Works: GLENBOIG, LANARKSHIRE.
Offices: 48, West Regent St., Glasgow.

56 Prize Medals and Diplomas of Honour.
Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, Leadenhall Street,
London, E.C., September 21st, 1909.

Dear Sirs,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 1000° C.	3·70%
" " " 1050° C.	4·76%
" " Total	8·46%
Volume shrinkage at 1000° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. 3362° F. (SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

THE WIGAN COAL & IRON CO., LIMTD.,

Are the exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, Wigan, and of the Manton Steam and House Coal Collieries, Worksop, Notts, and supply the well-known Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, House and Steam Coals, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone: No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.* Telegraphic Address: "PARKER, LONDON."

The Outcome of a Practical Gas Engineer's Life Experience.

THE CENTENARY PETROL GAS TURBINE GENERATOR.

FOR

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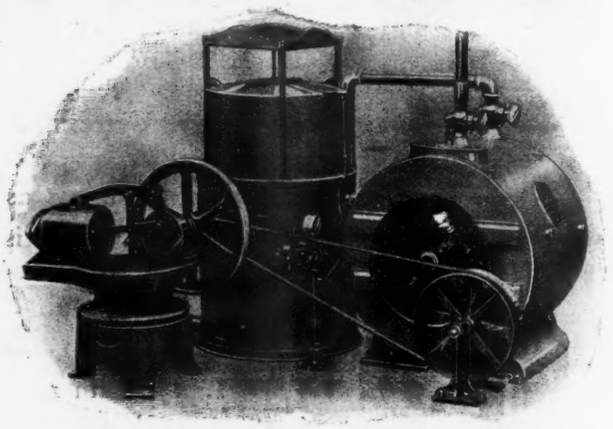
FOR

Villages,
Mansions,
Farm Steadings,
Churches, Schools,
Railway Stations,
County Lighting Districts.

Plants from 100 cub. ft. per hour up to 50,000 cub. ft. per hour for Gas Works.



THE CENTENARY GAS CO. (Dept. M.)

WILLIAM KEY, Engineer.

109, HOPE STREET, GLASGOW. 11, QUEEN VICTORIA STREET, LONDON.

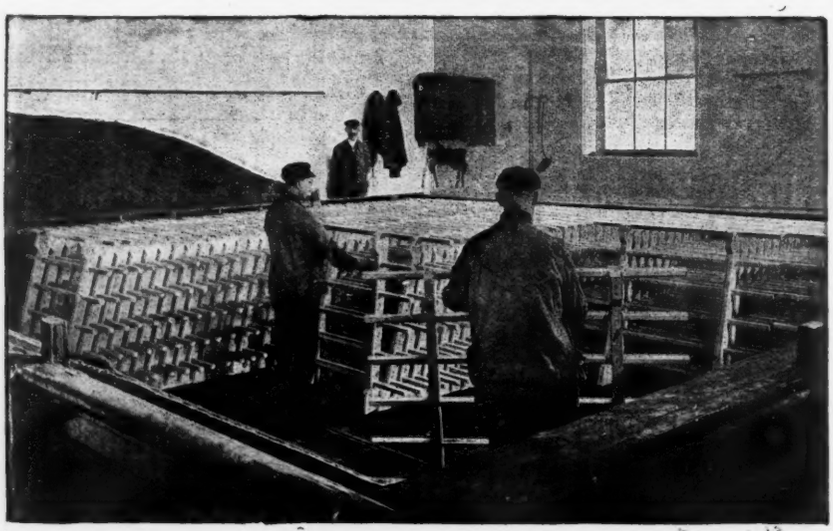
NON-EXPLOSIVE and ECONOMICAL.

The only Deep Grids which can be placed in Purifiers in an inclined position, so as to be Break-joint, are—

SPENCER'S PATENT HURDLE GRIDS

(Patented in England and Foreign Countries).

More than 1000 SETS Installed in Four Years.



The First Deep Grid invented, and the only one that holds Purifying Material in a light, porous condition.

Spencer's Patent Hurdle Grids break up the Material and suspend same in the Purifiers—a System acknowledged by all the leading Gas Engineers to be the best and most practical method yet made use of. They pass, on an average, Three times more Gas per change than Flat Grids, and reduce back-pressure more than half. The large and ever-increasing number of orders we receive from all parts of the world is convincing testimony as to their efficiency.

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The following are a few of the Places where our Hurdle Grids are in use—

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Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

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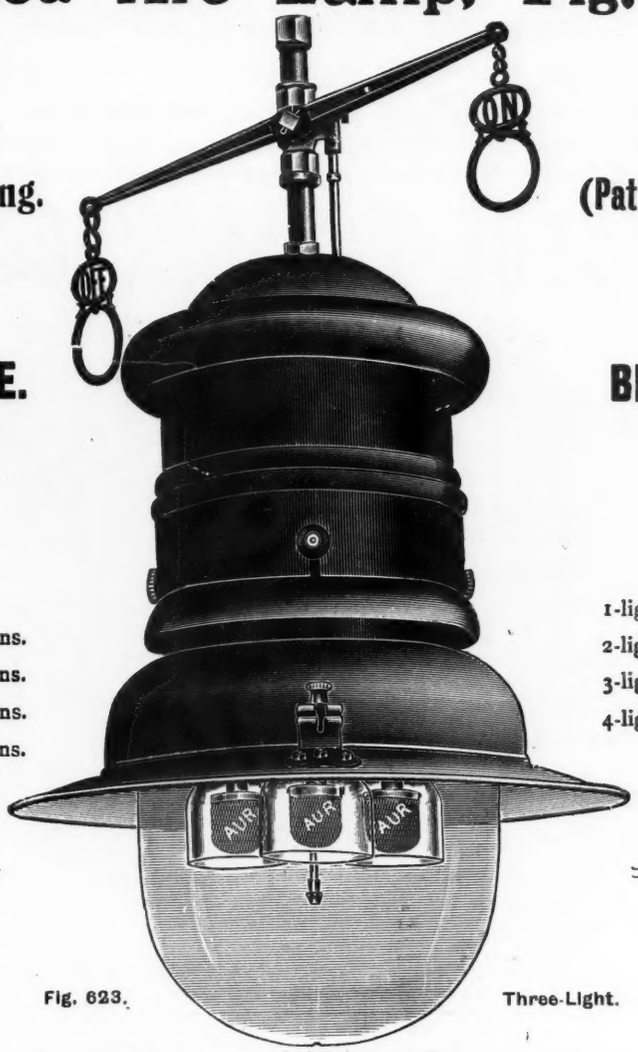

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*		*1-Light.*	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**	Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
„ „ „ In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**	Parabolic Reflector, extra „	**3/6**	**6/-**	**7/6**	Not made
Case contains . .	*80*	*18*	*18*	*12*	Welsbach Mantles, each **6d.** subject as usual.				

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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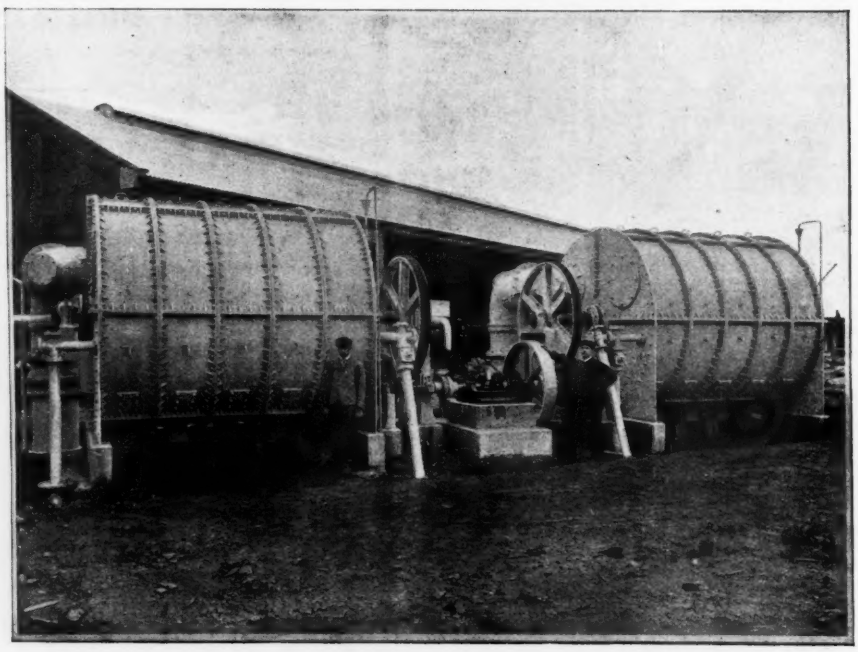

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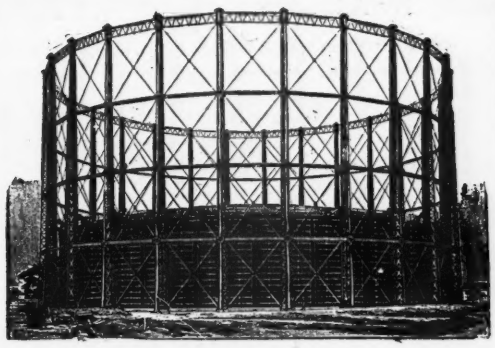

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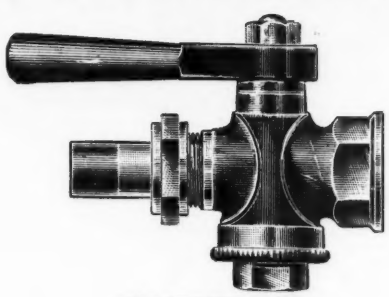

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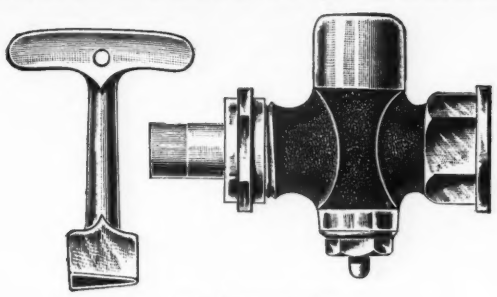

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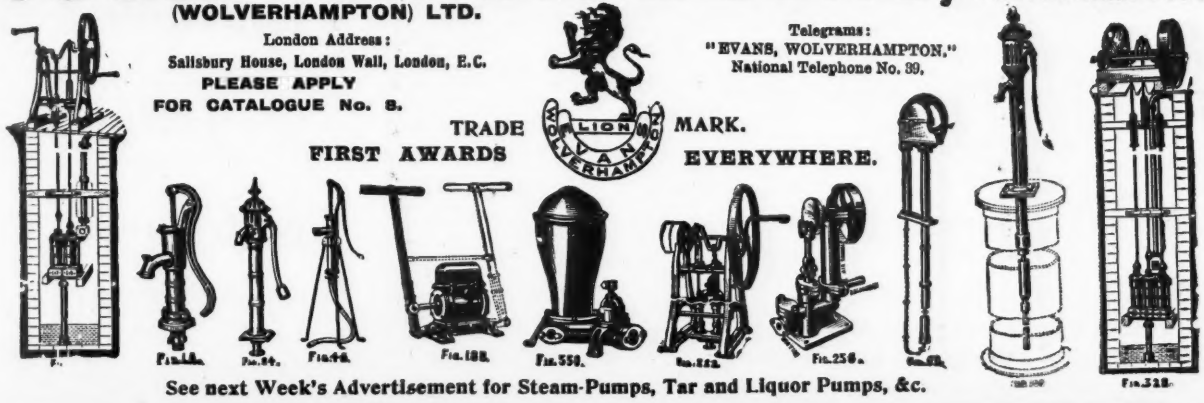

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